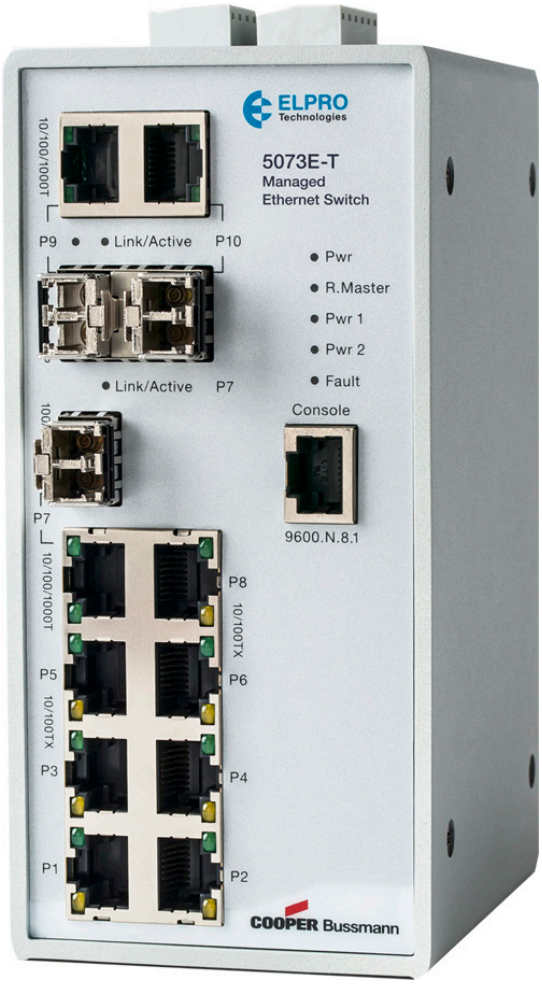
ELPRO Technologies



Read and Retain for Future Reference

Cooper Bussmann

5073E-T Managed Ethernet Switch User Manual

Version 1.1

COOPER Bussmann

Interference Issues

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial or industrial installation. This equipment generates, uses, and can radiate radio frequency energy, and may cause harmful interference to radio communications if it is not installed and used in accordance with the instructions.

UL Listed Models

When operating at elevated temperature extremes, the surface may exceed +75°C. For user safety, the 5073E-T should be installed in a restricted access location. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.

UL Notice

This equipment shall be powered using an external listed power supply with LPS outputs or a Class 2 Power Supply. The 5073E-T must be properly grounded for surge protection before use.

Hazardous Location Notices

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, and D; ambient temperature –40˚C to +50˚C or non-hazardous locations only.

WARNING: EXPLOSION HAZARD
Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

WARNING: EXPLOSION HAZARD
Substitution of any components may impair suitability for Class I, Division 2.

WARNING: EXPLOSION HAZARD
The area must be known to be non-hazardous before servicing or replacing the unit and before installing the unit.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class-A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and may cause harmful interference to radio communications if it is not installed and used in accordance with the instructions. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception (which can be determined by turning the equipment off and on) try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a different circuit from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for assistance.

CE Mark Warning

This is a Class-A product. In a domestic environment this product may cause radio interference, in which case you may be required to take adequate measures.

Important Notice

Cooper Bussmann/ELPRO Technologies reserves the right to modify the equipment, its specification, or this manual without prior notice in the interest of improving performance, reliability, or servicing. At the time of publication all data is correct for the operation of the equipment at the referenced voltage and/or temperature. Performance data indicates typical values related to the particular product.

No part of this documentation or information supplied may be divulged to any third party without the express written consent of Cooper Bussmann/ELPRO Technologies. Products offered may contain software that is proprietary to Cooper Bussmann/ELPRO Technologies. The offer or supply of these products and services does not include or infer any transfer of ownership.

Release Notice

This is the November 2013 release of the 5073E-T Managed Ethernet Switch User Manual version 1.1, which applies to firmware version 1.11.

Follow Instructions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow the instructions can cause personal injury and/or property damage.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (1) constitute “misuse” and/or “negligence” within the meaning of the product warranty, thereby excluding warranty coverage for any resulting damage; and (2) invalidate product certifications or listings.

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CHAPTER 1 - INTRODUCTION

The 5073E-T Managed Ethernet Switch is a 7-Port 10/100 TX and 3-Port 10/100/1000T/Dual Speed SFP switch that provides a cost effective solution that meets the high reliability requirements demanded by industrial applications. The switch's fiber port can extend the connection distance, increasing network elasticity and performance.

1.1 Module Identification

The identification label is on the bottom of the 5073E-T Switch. This label contains the model number, temperature range, power range, serial number, and all certifications.

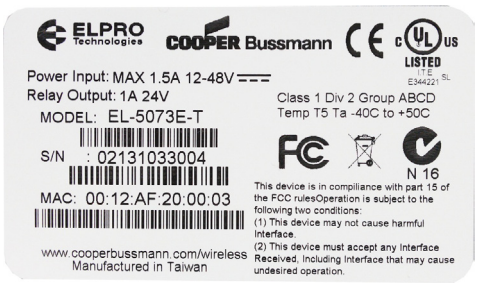

ELPRO Technologies
COOPER Bussmann
LISTED
Power Input: MAX 1.5A 12-48V
Relay Output: 1A 24V
MODEL: EL-5073E-T
S/N : 02131033004
MAC: 00:12:AF:20:00:03
www.cooperbussmann.com/wireless
Manufactured in Taiwan
Class 1 Div 2 Group ABCD
Temp T5 Ta -40C to +50C
N 16
This device is in compiliance with part 15 of the FCC rulesOperation is subject to the following two conditions:
(1) This device may not cause harmful interface.
(2) This device must accept any Interface Received, Including Interface that may cause undesired operation.

Figure 1 Module Identification Label

1.2 Mechanical Specifications

This section provides the exterior dimensions of the 5073E-T Ethernet Switch.

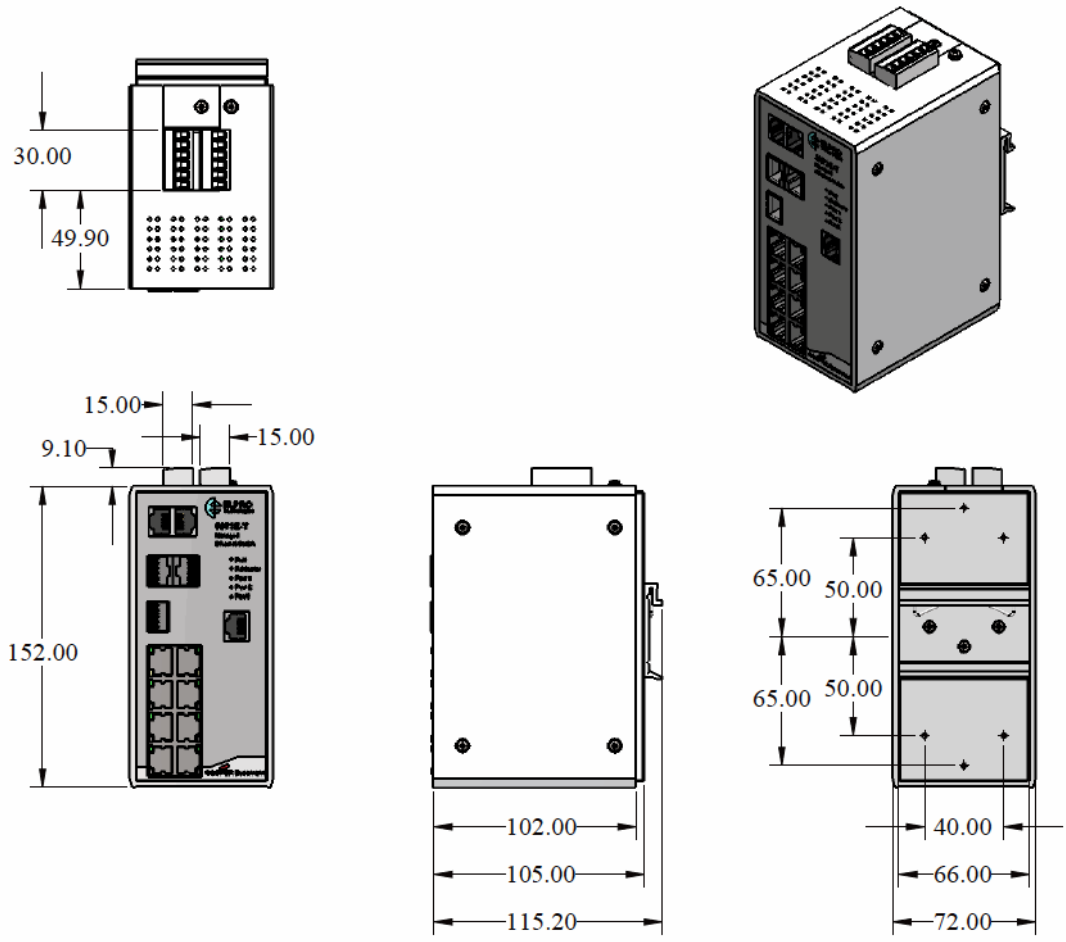


Figure 2 5073E-T Mechanical Specifications

1.3 Order Information

Item	Product Code	Description	Data Sheet
Ethernet Switch	5073E-T	7+3G-Port Gigabit Managed Ethernet Switch with DIDO	10084

1.4 Hardware Features

Feature	Description
Standard	IEEE 802.3 10Base-T Ethernet IEEE 802.3u 100Base-TX/ FX IEEE802.3ab 1000Base-T IEEE802.3z Gigabit Fiber IEEE802.3x Flow Control and Back Pressure IEEE802.3ad Port Trunk with LACP IEEE802.1d Spanning Tree/ IEEE802.1w Rapid Spanning Tree IEEE802.1p Class of Service IEEE802.1Q VLAN Tag IEEE 802.1X User Authentication (Radius) IEEE802.1ab LLDP
Switch Architecture	Back-plane (Switching Fabric): 7.4 Gbps Packet Throughput Ability (Full-Duplex): 8.3 Mpps @ 64 bytes
Transfer Rat	14,880 pps for Ethernet Port 148,800 pps for Fast Ethernet Port 1,488,000 pps for Gigabit Fiber Ethernet Port
Packet Buffer	1 Mbits
MAC Address	8K MAC Address Table
Flash ROM	4 Mbytes
DRAM	32 Mbytes
Connector	10/100TX: 7 x RJ-45 10/100/1000T/ Mini-GBIC Combo: 3 x RJ-45 + 3 x 100/1000 SFP Sockets RS-232 Connector: RJ-45 type
Network Cable	10Base-T: 2-pair UTP/STP Cat. 3, 4, 5/ 5E cable, EIA/TIA-568 100-ohm (100 m) 100Base-TX: 2-pair UTP/STP Cat. 5/ 5E cable, EIA/TIA-568 100-ohm (100 m) 1000Base-TX: 2-pair UTP/STP Cat. 5/ 5E cable, EIA/TIA-568 100-ohm (100 m)
Optical Fiber	Multi-mode: 50/125 μm to 62.5/125 μm Single mode: 9/125 μm Available distance: • Multi-mode: maximum 2 km • Single-mode: maximum 30 km Wavelength: 1310 nm (Multi-mode and Single-mode)
Protocol	CSMA/CD IGMPv1/v2, GVRP, RSTP/STP, LLDP, LACP, SNMPv1/v2c/v3, DHCP Server/Client/Port and IP Binding, DNS, TFTP, SNTP, HTTP, Telnet, Syslog, LLDP, 802.1X Authentication/Radius
LED	Per unit: Power (Green), Power 1 (Green), Power 2 (Green), Fault (Red), R. Master (Green) 7 port 10/100: Link/Activity (Green), Full duplex/Collision (Amber) SFP port: Link/Active(Green), 1000T: Link/Active(Green), 1000M (Green)

Feature	Description
Power Supply	External Power Supply: DC 12–48 V, Redundant power DC 12–48 V and connective removable terminal block for master and slave power.
Power Consumption	10.2 Watts (Full load)
Operating Humidity	5% to 95% (Non-condensing)
Operating Temperature	-40°C to 75°C
Storage Temperature	-40°C to 85°C
Case Dimension	IP-30, 72 mm (W) x 105 mm (D) x 152 mm (H)
Installation	DIN Rail and Wall Mount Ear
EMI	FCC Class A, CE EN61000-4-2, CE EN61000-4-3, CE EN-61000-4-4, CE EN61000-4-5, CE EN61000-4-6, CE EN61000-4-8, CE EN61000-4-11, CE EN61000-4-12, CE EN61000-6-2, CE EN61000-6-4
Safety	UL, cUL, CE/EN60950-1 UL Class 1 Division II for Group A, B, C and D Hazardous Location (this certification is for a switch using RJ-45 ports; it does not apply to a switch using one or more fiber modules)
Stability Testing	IEC60068-2-32 (Free fall), IEC60068-2-27 (Shock), IEC60068-2-6 (Vibration)

1.5 Software Features

Feature	Description
Management	SNMP v1, v2c, v3/ Web/Telnet/CLI/InVision NMS
SNMP MIB	RFC 1215 Trap, RFC1213 MIBII, RFC 1157 SNMP MIB, RFC 1493 Bridge MIB, RFC 2674 VLAN MIB, RFC 1643 Ethernet-like , RFC 1757 RMON, RSTP MIB, Private MIB (el5073et.mib), LLDP MIB
VLAN	Port Based VLAN IEEE 802.1Q Tag VLAN (256 entries)/ VLAN ID (up to 4K, VLAN ID can be assigned from 1 to 4094) GVRP (256 Groups)
Port Trunk with LACP	LACP Port Trunk: five Trunk groups/Maximum four Trunk Members
LLDP	Supports LLDP allowing switch to advertise its identification and capability on the LAN
Spanning Tree	IEEE802.1d Spanning Tree IEEE802.1w Rapid Spanning Tree
Pro-Ring2se	Supports Pro-Ring2se. Provides redundant backup feature and the recovery time below 20 ms up to 50 switches in a ring
Quality of Service	Quality of service is determined by port, Tag and IPv4 Type of service, IPv4 Differentiated Service
Class of Service	Supports IEEE802.1p Class of service, per port provides four priority queues
Port Security	Supports 100 entries of MAC address for Static MAC and another 100 for MAC filter
Port Mirror	Supports 3 mirroring types: RX, TX and Both packet
IGMP	Supports IGMP Snooping v1,v2 256 Multicast Groups and IGMP Query
IP Security	Supports 10 IP addresses that have permission to access the switch management and to prevent unauthorized intruder
Login Security	Supports IEEE802.1X Authentication/RADIUS/Telnet

Feature	Description
Bandwidth Control	Supports ingress packet filter and egress packet limit The egress rate control supports all of packet type and the limit rates are 100K to 102400 kbps (10/100), 100 K–256000 Kbps (1000). Ingress filter packet type combination rules are Broadcast/Multicast/Unknown Unicast packet, Broadcast/Multicast packet, Broadcast packet only and All of packet. The packet filter rate can be set from 100K to 102400 Kbps (10/100), 100K to 256000 Kbps (1000).
Flow Control	Supports flow control for full-duplex and back pressure for half-duplex
System Log	Supports system log record and remote system log server
Relay Alarm	Provides one relay output for port breakdown, power fail Alarm relay current carry ability: 1A @ 24 Vdc
SNMP Trap	• Link up trap • Link down trap • Cold start trap • Authentication failure Private/Specific Trap: • DC power status trap • Digital input trigger (configurable) • Topology change trap
DHCP	Provides DHCP client/ DHCP server/port and IP binding
DNS	Provides DNS client feature and supports primary and secondary DNS server
SNTP	Supports SNTP to synchronize system clock in Internet
Firmware Update	Supports TFTP/Web firmware update
Configuration Upload/ Download	Supports binary format configuration file for system quick installation Supports TFTP backup and restore
ifAlias	Each port allows importing 128-bits of alphabetic string on SNMP and CLI interface

1.6 Package Contents

Compare the contents of the 5073E-T Switch with the following standard content list. If any item is damaged or missing, please contact your local dealer for service.

- 7-Port 10/100TX + 3-Port 10/100/1000T/Dual Speed SFP Combo Managed Industrial Switch x 1
- Pluggable terminal block x 2
- Mounting plate x 2
- RJ-45 to DB-9 female cable x 1
- Installation Guide
- Quick Start Guide

CHAPTER 2 - HARDWARE DESCRIPTION

This chapter describes hardware specifications, ports, cabling information, and wiring installation information for the 5073E-T.

2.1 Front Panel

The front panel includes seven 10/100 TX RJ-45 ports, three 10/100/1000T/ Mini-GBIC Combo ports, each with an RJ-45 and a 100/1000 SFP connector, one RS-232 connector (RJ-45 type) for connecting to a console (terminal or PC), and diagnostic LEDs.

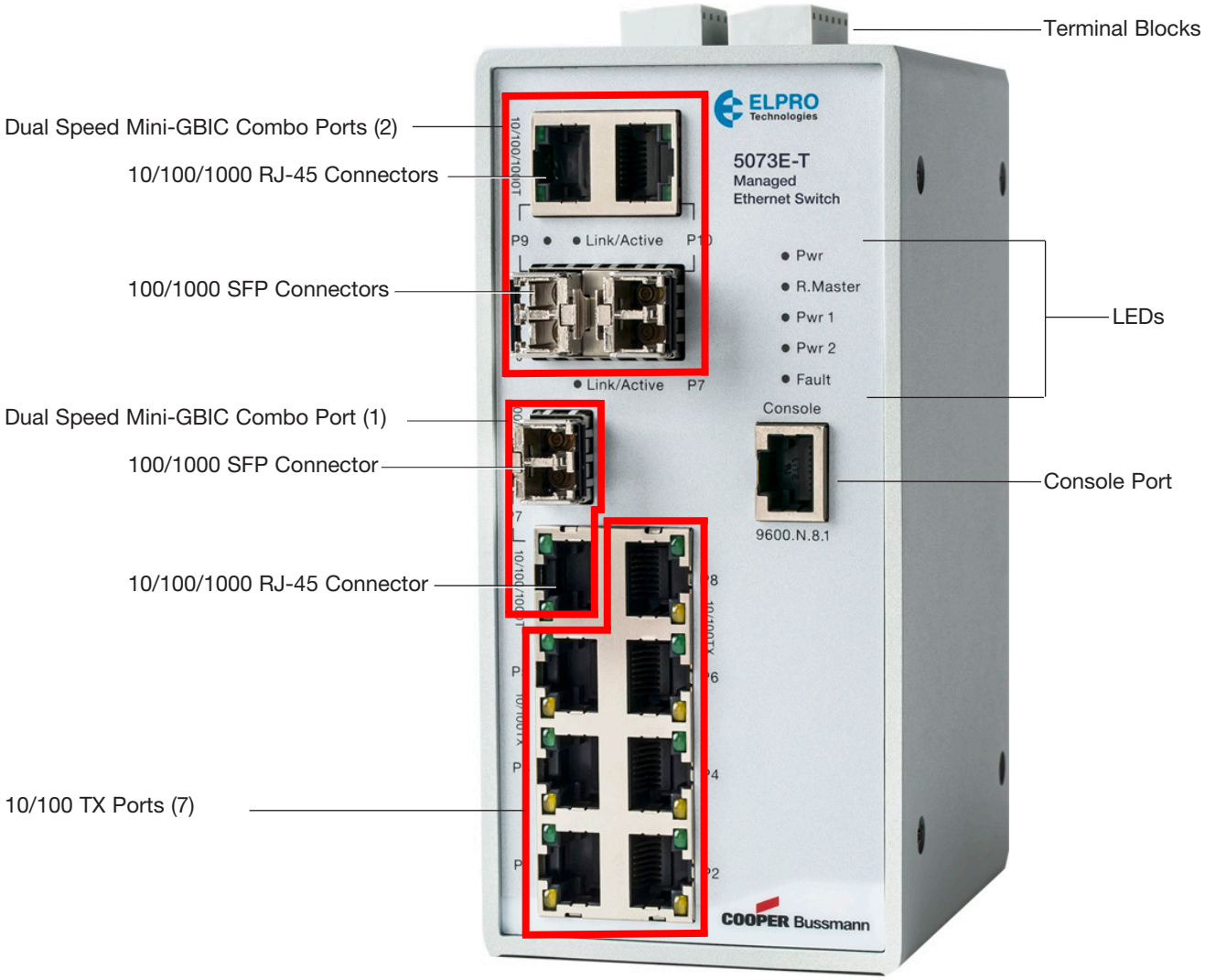


Figure 3 Front Panel of 5073E-T Switch

2.2 Top View

The top panel of the 5073E-T Switch includes two terminal block connectors. One terminal block has two DC power inputs and one fault alarm, and the other has two digital inputs (DI) and two digital outputs (DO).

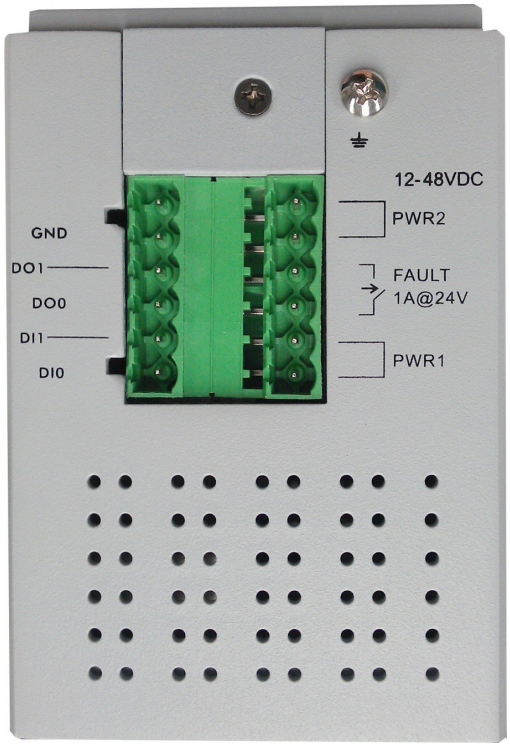


Figure 4 Top Panel of 5073E-T Switch

2.3 LED Indicators

The diagnostic LEDs are located on the front panel of the industrial switch and provide real-time information about the system. The following table describes each LED state.

LED	Color	State	Description
Pwr	Green	On	The switch unit is powered on
		Off	No power
R.Master	Green	On	The switch is a master in Pro-Ring2se group
		Off	The switch is a slave in Pro-Ring2se group, or Pro-Ring2se is disabled
Pwr1	Green	On	Power 1 is active
		Off	Power 1 is inactive
Pwr2	Green	On	Power 2 is active
		Off	Power 2 is inactive
Fault	Red	On	Power or port failure
		Blinking	Location alert
		Off	No failure

LED	Color	State	Description
P7, P9, P10 (RJ-45)	Green (Upper LED)	On	A network device is detected
		Blinking	The port is transmitting or receiving packets from the TX device
		Off	No device is attached
	Green (Lower LED)	On	1000 M
		Off	10/100 M
Link/Active (P7, P9, P10 SFP)	Green	On	The SFP port is linking
		Blinking	The port is transmitting or receiving packets from the TX device
		Off	No device is attached
P1–P6, P8	Green	On	A network device is detected
		Blinking	The port is transmitting or receiving packets from the TX device
		Off	No device attached
	Amber	On	The port is operating in full-duplex mode
		Blinking	Collision of packets occurred
		Off	The port is in half-duplex mode or no device is attached

CHAPTER 3 - HARDWARE INSTALLATION

This chapter describes how to install the 5073E-T Managed Ethernet Switch.

3.1 Installation Steps

1. Unpack the 5073E-T Ethernet Switch.

   The DIN rail is screwed onto the switch by default. To wall mount the 5073E-T Switch, refer to "3.3 Wall Mount Plate Mounting."

2. Hang the switch on the DIN rail track or wall.

3. Power on the switch.

   For information on wiring the power, see "3.4 Wiring the Power Inputs."

   When the switch is powered on, the power LED turns on. Refer to "2.3 LED Indicators" for information about the LEDs.

4. Prepare the twisted-pair straight-through Category 5 cable for the Ethernet connection.

5. Insert one end of the RJ-45 (Category 5) cable into the Ethernet port (RJ-45 port) on the 5073E-T Switch and insert the other end of the same cable into the Ethernet port (RJ-45 port) on the network device (a switch, PC, or server).

   The UTP port (RJ-45) LED on the 5073E-T will turn on when the cable is connected to the network device. See "2.3 LED Indicators" for details about the LEDs.

   NOTE Make sure that the connected network device supports MDI/MDI-X. If it does not, use the crossover Category 5 cable.

6. When all connections are set and the LEDs all indicate status is normal, the installation is complete.

3.2 DIN Rail Mounting

The 5073E-T normally ships from the factory with the DIN rail mount kit installed. If the DIN rail is not installed, refer to Figure 5 to screw the DIN rail onto the switch. Then, follow the steps to mount the switch.

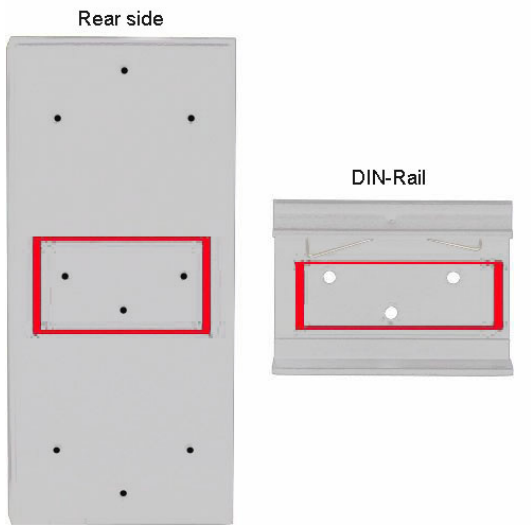
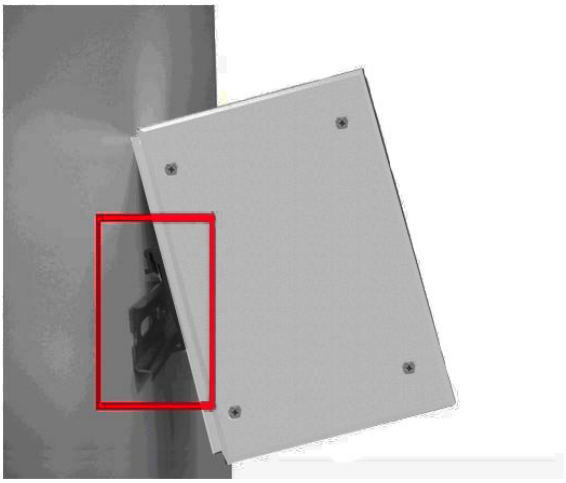
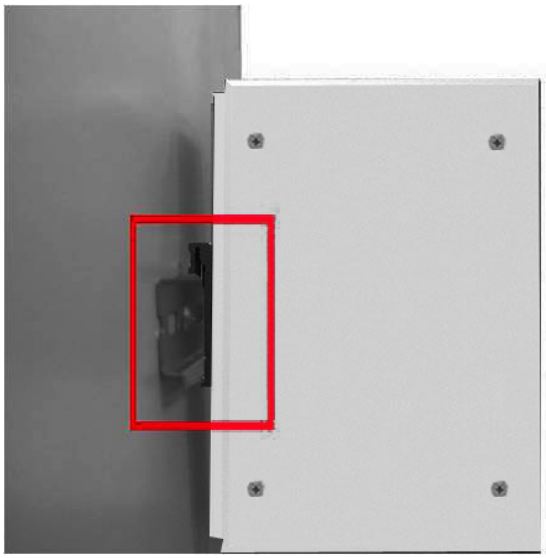


Figure 5 Rear Side of 5073E-T Switch and DIN Rail

1. Insert the top of the DIN rail into the track.



2. Press the DIN rail into the track.



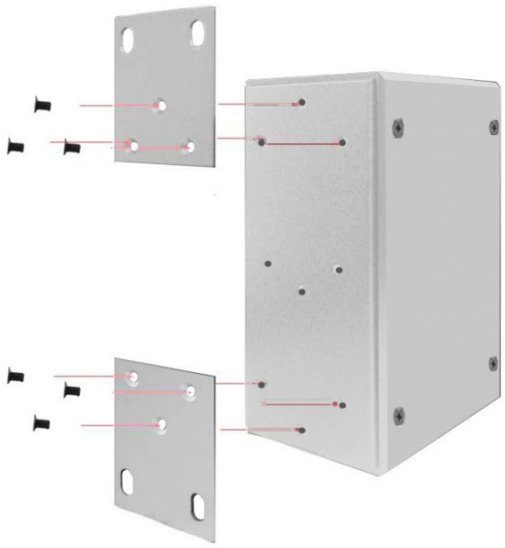
3. Check that the DIN rail is firmly secured to the DIN rail track.

To remove the industrial switch from the track, reverse the steps above.

3.3 Wall Mount Plate Mounting

Follow these steps to mount the switch using a wall mount plate.

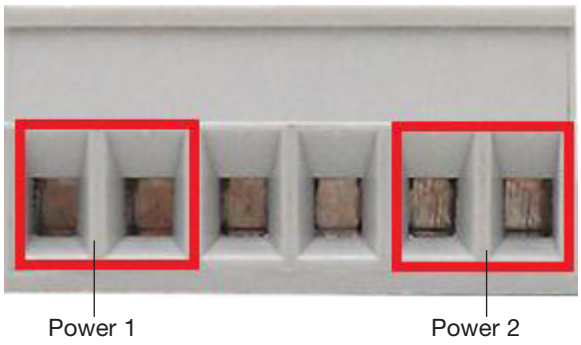
1. Loosen the screws to remove the DIN rail from the 5073E-T Switch.
2. Place the wall mount plate on the rear panel of the switch.
3. Use the screws to screw the wall mount plate onto the switch.
4. Use the hook holes at the corners of the wall mount plate to hang the switch on the wall.
5. To remove the wall mount plate, reverse the steps above.



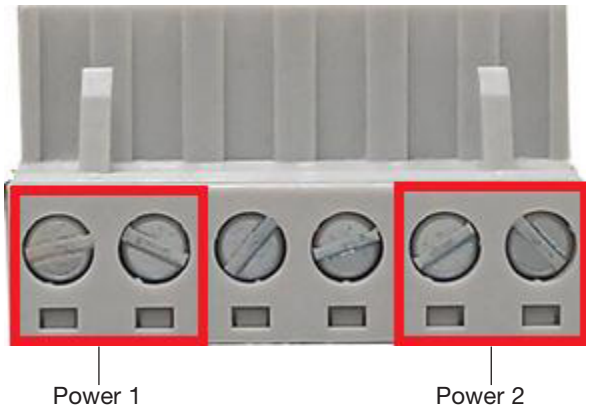
3.4 Wiring the Power Inputs

Use the following steps below to insert the power wire.

1. Insert the DC power wires into the contacts for power 1 and power 2, as shown below.



2. Tighten the wire-clamp screws to prevent the wires from coming loose.



NOTE The wire gauge for the terminal block should be within the range 12–24 AWG.

3.5 Wiring the Fault Alarm Contact

The fault alarm contacts are in the middle of the terminal block connector, as shown in Figure 6. Insert the wires into the fault alarm contacts. After the wires are inserted, the switch detects the fault status of the power failure or port link failure, and then forms an open circuit. Figure 7 shows an application example for wiring the fault alarm contacts.

NOTE The wire gauge for the terminal block should be within the range 12–24 AWG.

Figure 6 Terminal Block

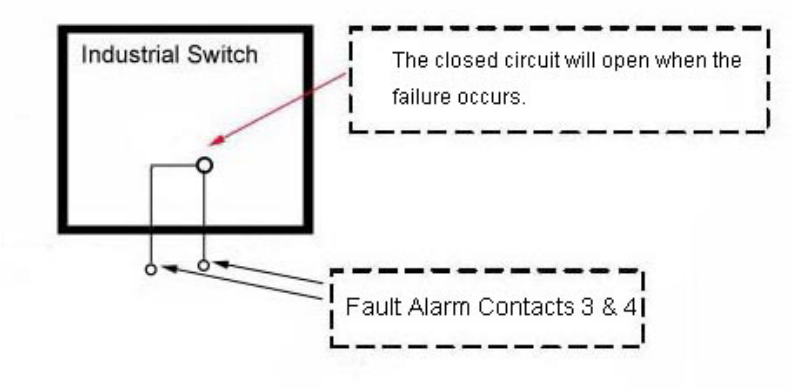


Figure 7 Application Example

3.6 Cabling

Use four twisted-pair, Category 5e (or above) cabling for the RJ-45 port connection. The cable between the switch and the link partner (for example, switch, hub, workstation) must be less than 100 meters (328 ft) long. The fiber segment using the single-mode connector type must use 9/125 µm single-mode fiber cable. You can connect two devices up to 32 km apart. The fiber segment using the multi-mode connector type must use 50 or 62.5/125 µm multi-mode fiber cable. You can connect two devices up to 2 km apart.

Gigabit Copper/SFP (Mini-GBIC) Combo Port

The 5073E-T Switch has three auto-detected gigabit cooper/SFP ports, which are the Mini-GBIC Combo ports. These ports should use Category 5e (or above) UTP/STP cable for connections up to 1000 Mbps. The small form-factor pluggable (SFP) is a compact optical transceiver used in optical communications for both telecommunication and data communications. The SFP slots supporting dual mode can switch the connection speed between 100 and 1000 Mbps, and are used for connecting to the network segment with single or multi-mode fiber. Choose the appropriate SFP transceiver to plug into the slots, and make sure to use the same type of tranceiver on both of the SFP ports that you are connecting. For a list of SFP tranceivers, see “1.3 Order Information” on page 7. Use proper multi-mode or single-mode fiber, according to the transceiver. Fiber optic transmits at speed up to 1000 Mbps and prevents noise interference.

NOTE The SFP port and copper combo port cannot function at the same time. The SFP port has a higher priority than the copper port. If you insert the 1000 M SFP transceiver (which is connected to the remote device via fiber cable) into the SFP port, the connection of the accompanying copper port will link down. If you insert the 100M SFP transceiver into the SFP port (even without a fiber connection to the remote) the connection of the accompanying copper port will link down immediately.

Follow these steps to connect the transceiver and LC cable.

1. Insert the SFP transceiver module into the SFP Mini-GBIC port. Notice that the triangle mark is on the bottom of the module.

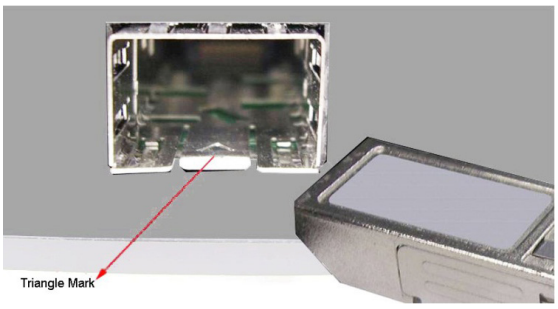


Figure 8 Transceiver to SFP Module

Figure 9 Transceiver Inserted

2. Insert the fiber cable of the LC connector into the transceiver.

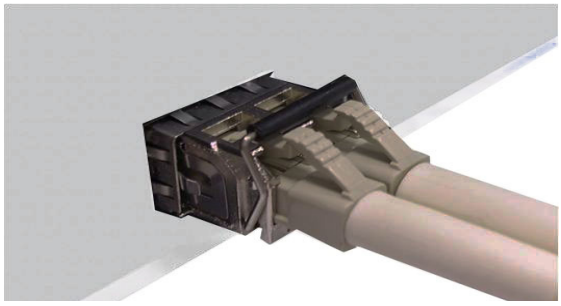


Figure 10 LC Connector to Transceiver

3. To remove the LC connector from the transceiver, do the following:
   a. Press the upper side of the LC connector to release from the transceiver, and then pull it out.

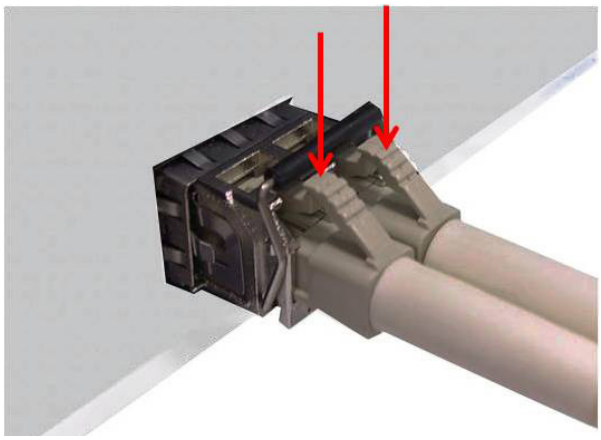


Figure 11 Remove LC Connector

b. Pull out the plastic handle to release the transceiver, and then grasp the tranceiver and pull it out.

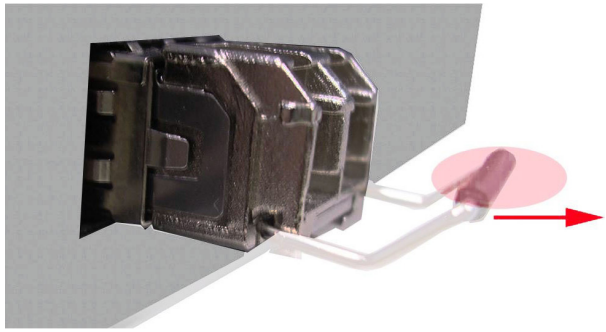


Figure 12 Pull Transceiver Out of SFP Port

CHAPTER 4 - NETWORK APPLICATIONS

This chapter provides sample applications for the Cooper Bussmann/ELPRO Technologies Industrial Ethernet Switches.

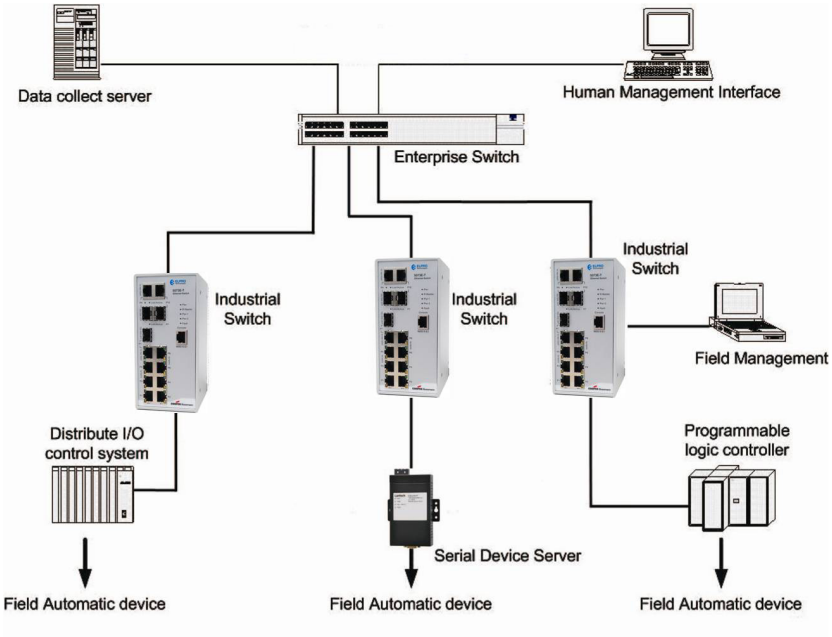


Figure 13 Sample Application

4.1 Pro-Ring2se Application

Pro-Ring2se is a new ring mechanism for the Cooper Bussmann/ELPRO Technologies Industrial Ethernet Switches. As Figure 15 shows, Pro-Ring2se can be constructed using two ports of the same type in each 5073E-T. Refer to "6.5.5 Redundancy - Pro-Ring2se" for information on configuring each switch to enable the Pro-Ring2se feature.

NOTE Pro-Ring2se is not compatible with other Pro-Ring mechanisms.

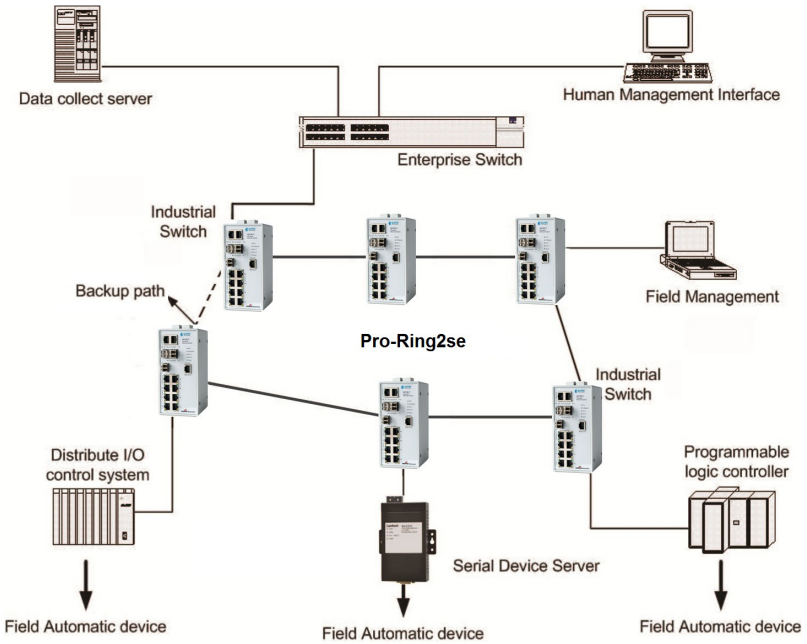


Figure 14 Pro-Ring2se Application

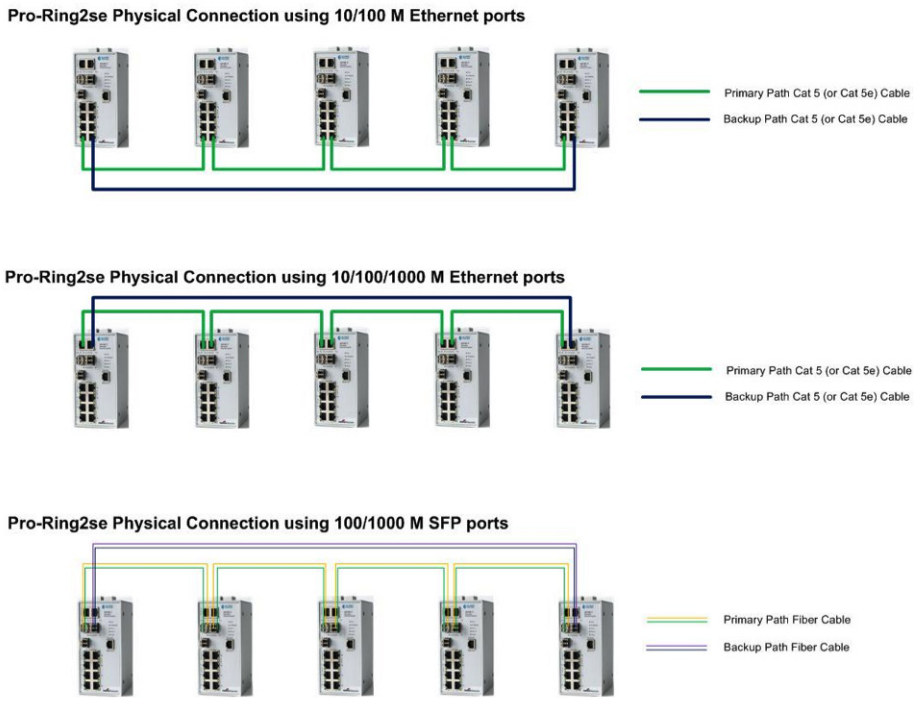

Pro-Ring2se Physical Connection using 10/100 M Ethernet ports
Primary Path Cat 5 (or Cat 5e) Cable
Backup Path Cat 5 (or Cat 5e) Cable
Pro-Ring2se Physical Connection using 10/100/1000 M Ethernet ports
Primary Path Cat 5 (or Cat 5e) Cable
Backup Path Cat 5 (or Cat 5e) Cable
Pro-Ring2se Physical Connection using 100/1000 M SFP ports
Primary Path Fiber Cable
Backup Path Fiber Cable

Figure 15 Pro-Ring2se Connection Examples

CHAPTER 5 - CONSOLE-BASED MANAGEMENT

The 5073E-T Managed Ethernet Switch supports a CLI command interface that can be accessed by connecting the switch to a terminal or to a PC running a terminal emulator. This chapter describes how to connect and log onto the Console port (see Figure 3). Refer to “Appendix B - COMMAND SETS” for command descriptions and examples.

5.1 Connecting to the Console Port

A RS-232 to RJ-45 connector cable is supplied with the switch (Figure 16). Connect the RS-232 connector to PC or terminal and the RJ-45 connector to the console port of the 5073E-T switch. The connected terminal or PC must support a terminal emulation program, such as HyperTerminal or PuTTY.

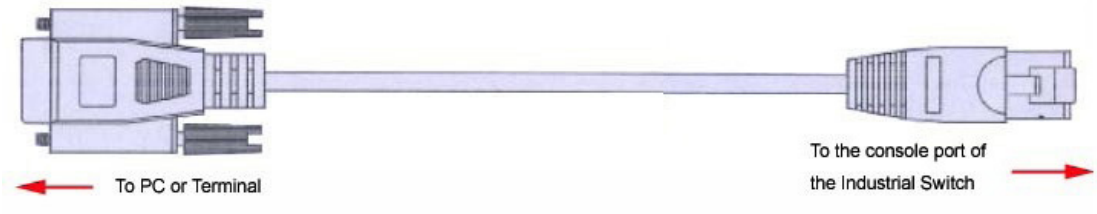


Figure 16 RS-232 TO RJ-45 Connector

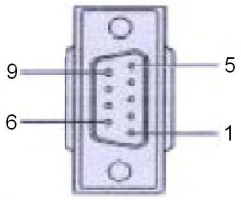


Figure 17 DB-9 Pin Female

5.2 Pin Assignment

DB-9 Connector	RJ-45 Connector
NC	1 Orange/White
2	2 Orange
3	3 Green/White
NC	4 Blue
5	5 Blue/White
NC	6 Green
NC	7 Brown/White
NC	8 Brown

5.3 Logging onto the Console Interface

1. After connecting the 5073E-T Switch to the PC, turn on the PC.

   For connection instructions, see “5.1 Connecting to the Console Port.”

2. Run the terminal emulation program (for example, HyperTerminal or PuTTY) and configure its communication parameters to match the following default characteristics of the console port.

   - **Baud Rate:** 9600 bps
   - **Data Bits:** 8
   - **Parity:** None
   - **Stop Bit:** 1
   - **Flow control:** None

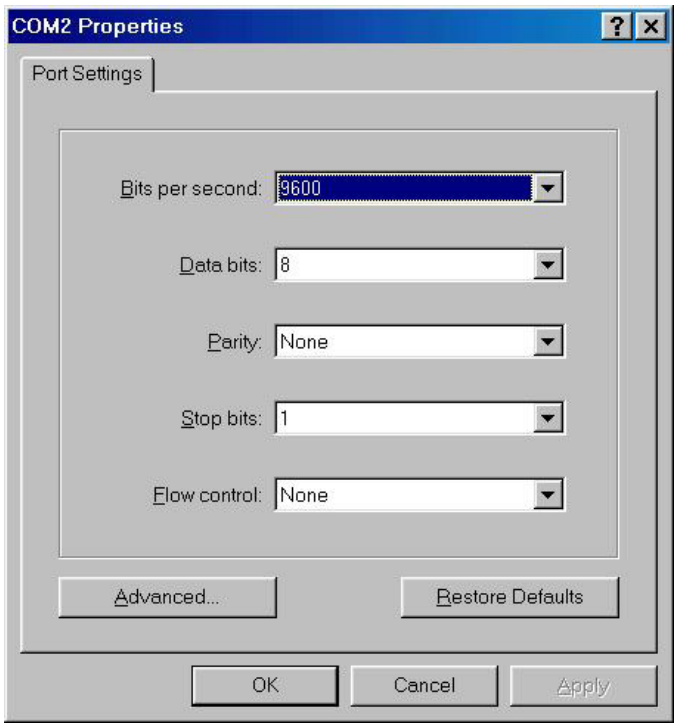


Figure 18 Communication Parameters

3. After setting the communication parameters, click **OK**.
4. At the blank screen, press **Enter** to display the login prompt.
5. At the login prompt (Figure 19), type the default user name “admin” and press **Enter**. When prompted for a password, type the default password “password” and press **Enter**.

   The Main Menu of Console Management appears.

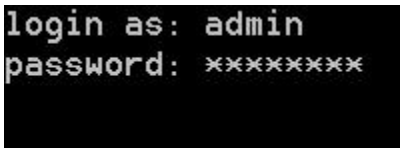


Figure 19 Console Login

5.4 CLI Management

The system supports the console management CLI commands. After logging on to the system, you will see a command prompt. To enter the CLI management interface, type the “enable” command. See “Appendix B - COMMAND SETS” for command descriptions and examples.

Figure 20 CLI Command Interface

CHAPTER 6 - WEB-BASED MANAGEMENT

The 5073E-T Switch has an embedded Web-based management utility that resides in flash memory on its CPU board. This utility offers advanced features that allow you to manage the switch from anywhere on the network through a standard browser such as Microsoft® Internet Explorer®. The utility supports Internet Explorer version 8.0 or later, and has Java Applets for reducing network bandwidth consumption and enhancing access speed and screen display. This chapter provides information on the configuration and functions of the 5073E-T Web-based management utility.

6.1 Preparing for Web Management

Before using the Web-based Management Utility, install the 5073E-T Switch on the network and make sure that all PCs on the network can connect with the switch through the Web browser. The default IP address, subnet mask, username, and password for the 5073E-T Switch are as follows:

- **IP Address:** 192.168.1.88
- **Subnet Mask:** 255.255.255.0
- **Default Gateway:** 192.168.1.254
- **User Name:** admin
- **Password:** password

6.2 System Login

Follow these steps to log on to the Web-based Management Utility.

1. Launch Internet Explorer on the PC.
2. Type “http://” followed by the IP address of the switch, and press **Enter**.

   The login screen appears.

3. Type the user name and password.

   The default username is “admin” and default password is “password”.

Windows Security
The server 192.168.1.88 at banner.htm requires a username and password.
Warning: This server is requesting that your username and password be sent in an insecure manner (basic authentication without a secure connection).
admin
Remember my credentials
OK
Cancel

4. Press **Enter** or click **OK**.

   The home page of the Web-based Management utility appears (see Figure 21).

6.3 Web Page Overview

The Web-based Management Utility uses a standard Web interface with the menu on the left. Click to expand a menu, and click to collapse a menu. You can also expand or collapse the entire menu tree by clicking **Open All** or **Close All**. Click a menu item to the page.

The **Help** button at the bottom of each page displays additional information about page contents.

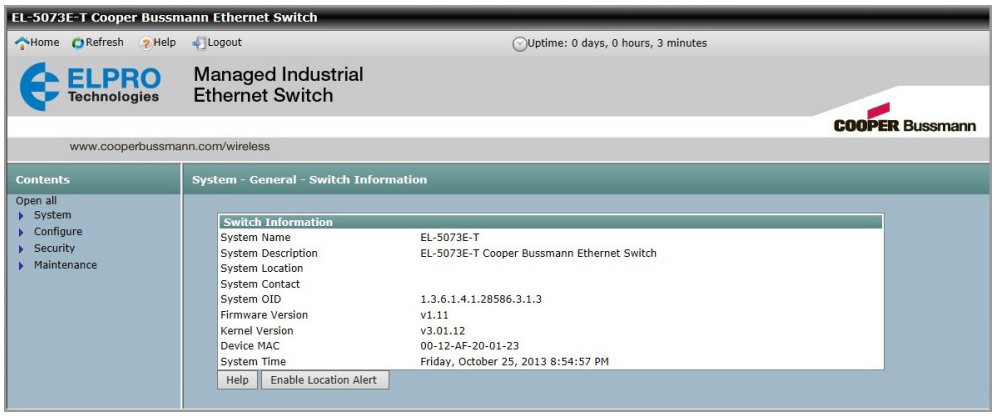


Figure 21 Home Page - Web-based Management Utility

6.4 System Menu

6.4.1 General

Switch Information

The Switch Information page (Figure 22) appears when you log on to the Web-based Management utility. You can also display this page by choosing **System**-->**General**-->**Switch Information**. Switch information includes the system name, description, location and contact personnel to identify the switch. The information is read-only.

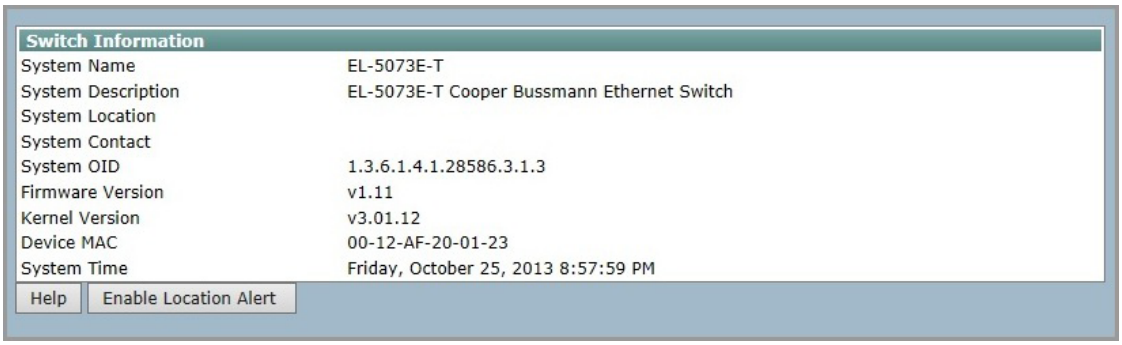


Figure 22 Switch Information Page

System Name	System name of the switch.
System Description	Switch description.
System Location	Physical location of the switch.
System Contact	Name of contact person or organization.
System OID	SNMP OID of switch.
Firmware Version	Switch firmware version.

Kernel Version	Kernel software version.
Device MAC	Unique hardware address assigned by the manufacturer.
System Time	Current time on switch.
Enable Location Alert	Click to cause the fault LED on the switch to flash.

Asset

The Asset page allows you to change switch settings, including the system name, description, location, and contact information. Choose **System**-->**General**-->**Asset** to display this page.

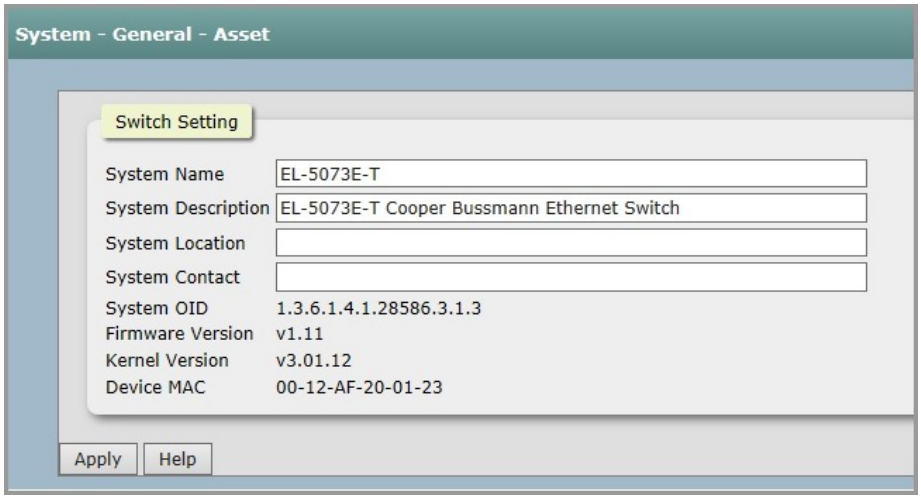


Figure 23 Asset Page

System Name	Assign the system name of the switch (the maximum length is 64 bytes).
System Description	Switch description.
System Location	Physical location of the switch (the maximum length is 64 bytes).
System Contact	Name of contact person or organization.
System OID:	SNMP OID of switch.
Firmware Version	Displays the switch's firmware version.
Kernel Version	Displays the kernel software version.
Device MAC	Displays the unique hardware address assigned by manufacturer.
Apply	Click to apply the settings.

CPU Load Average

To display the CPU load average for the switch, choose **System**-->**General**-->**CPU Load Average**. The load is averaged over the previous 1-minute, 5-minute, and 15-minute intervals, as shown in Figure 24. The X-axis indicates the minute intervals, and the Y-axis indicates the average CPU load. When the average CPU load reaches 90% the system logs an Event Alarm to the Syslog if the **Syslog** checkbox is selected under Event Alarm Setting at the bottom of the page. To enable the Syslog, see "6.4.5 Syslog."

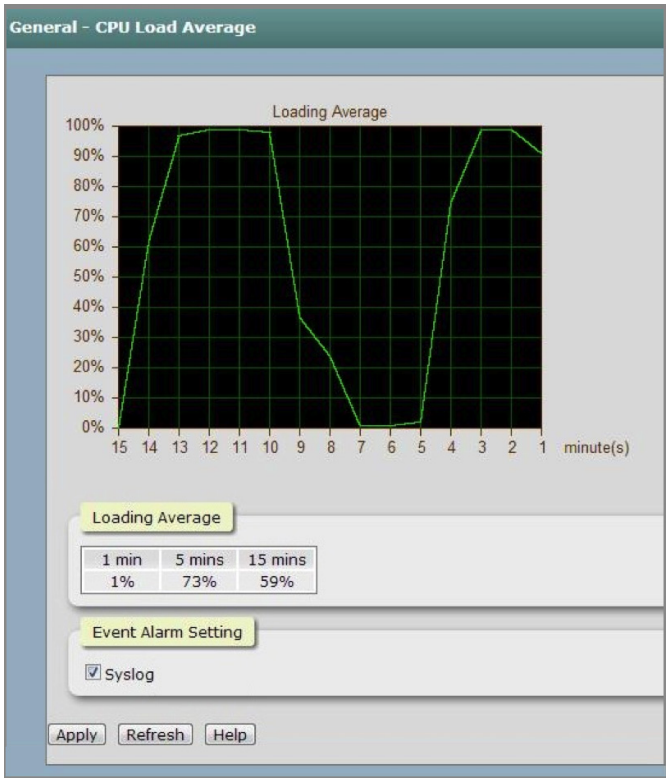


Figure 24 CPU Load Average Page

Loading Average	Displays the CPU load statistics.
Event Alarm Setting	Select the Syslog checkbox if you want an alarm to be logged to the Syslog when the CPU load exceeds 90% utilization.
Apply	Click to apply the Event Alarm Setting.
Refresh	Click to reload the graph and table.

6.4.2 Time - SNTP

To enable or disable the SNTP time function or set daylight savings time, choose **System**-->**Time**-->**SNTP**. SNTP (Simple Network Time Protocol) is a simplified version of NTP which is an Internet protocol used to synchronize the clocks of computers to a specified time reference. Because time typically advances, the time on various node stations will be different. For the communicating programs running on those devices, this causes time to jump forward and backward—an undesirable effect. Therefore, the switch provides comprehensive mechanisms to access national time and frequency dissemination services, and organize the time-synchronization subnet and the local clock in each participating subnet peer.

Daylight saving time (DST) is the convention of advancing clocks so that afternoons have more daylight and mornings have less. Typically, clocks are adjusted forward one hour near the start of spring and are adjusted back an hour in autumn.

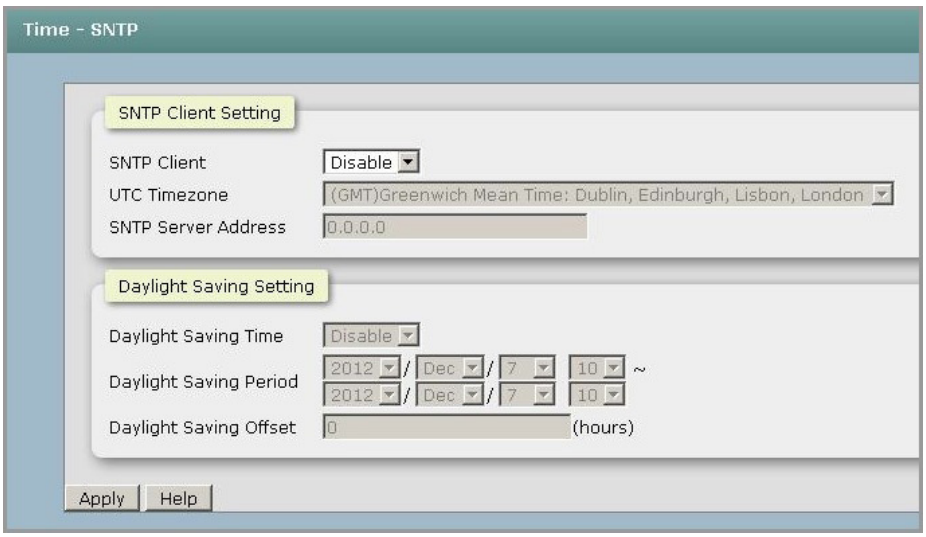


Figure 25 SNTP Page

SNTP Client — Enable or disable the SNTP function to get the time from the SNTP server. When enabled, the SNTP client uses the service from the SNTP server and the system time will follow the SNTP server. When disabled, local time is used without any SNTP server information.

NOTE when SNTP is enabled, a network connection between the 5073E-T switch and the SNTP server is required for the SNTP client within the switch to receive and synchronize time information to the time provided by the SNTP server.

UTC Timezone — Universal Time Coordinated. Sets the local time zone for the switch location. See Table 1 for a list of time zones.

SNTP Sever Address — Sets the SNTP server IP address. You can enter the IP address of a local network time server or an Internet time server.

Daylight Saving Time — Allows you to enable or disable the Daylight Saving Period and Daylight Saving Offset settings. When enabled, the Daylight Savings settings are in effect, and when disabled, these settings are ignored.

Daylight Saving Period — Sets the daylight saving beginning date and time and ending date and time. Enter the date in the format YYYYMMDD and the time in the format HH:MM (leave a space between YYYYMMDD and HH:MM).

Daylight Saving Offset — For non-US and European countries, specify the amount of time for day light savings. You can specify between 0 and 12 hours.

Apply — Click to apply the settings.

Table 1

Local Time Zone	Conversion from UTC	Time at 12:00 UTC
November Time Zone	- 1 hour	11am
Oscar Time Zone	-2 hours	10 am
ADT - Atlantic Daylight	-3 hours	9 am
AST - Atlantic Standard EDT - Eastern Daylight	-4 hours	8 am

Local Time Zone	Conversion from UTC	Time at 12:00 UTC
EST - Eastern Standard CDT - Central Daylight	-5 hours	7 am
CST - Central Standard MDT - Mountain Daylight	-6 hours	6 am
MST - Mountain Standard PDT - Pacific Daylight	-7 hours	5 am
PST - Pacific Standard ADT - Alaskan Daylight	-8 hours	4 am
ALA - Alaskan Standard	-9 hours	3 am
HAW - Hawaiian Standard	-10 hours	2 am
Nome, Alaska	-11 hours	1 am
CET - Central European FWT - French Winter MET - Middle European MEWT - Middle European Winter SWT - Swedish Winter	+1 hour	1 pm
EET - Eastern European, USSR Zone 1	+2 hours	2 pm
BT - Baghdad, USSR Zone 2	+3 hours	3 pm
ZP4 - USSR Zone 3	+4 hours	4 pm
ZP5 - USSR Zone 4	+5 hours	5 pm
ZP6 - USSR Zone 5	+6 hours	6 pm
WAST - West Australian Standard	+7 hours	7 pm
CCT - China Coast, USSR Zone 7	+8 hours	8 pm
JST - Japan Standard, USSR Zone 8	+9 hours	9 pm
EAST - East Australian Standard GST Guam Standard, USSR Zone 9	+10 hours	10 pm
IDLE - International Date Line NZST - New Zealand Standard NZT - New Zealand	+12 hours	Midnight

6.4.3 Account - Admin

Use the Admin page to change the login username and password for the Web-based Management utility to ensure access security. Choose **System**-->**Account**-->**Admin** to display this page.

Figure 26 Admin Page

User Name	Type the new user name (the default is “admin”).
New Password	Type the new password.
Confirm Password	Re-type the new password.
Apply	Click to apply the settings.

6.4.4 IP Addressing – IPV4

The 5073E-T Switch needs to be assigned an IP address that identifies it on the network. You can select a method of assigning IP address to the switch by choosing **System**-->**IP Addressing**-->**IPV4**.

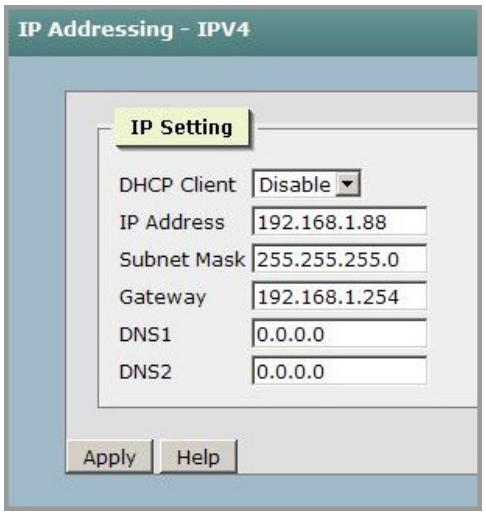


Figure 27 IPV4 Page

DHCP Client	Enable or disable the DHCP client function. When the DHCP client function is enabled, the switch will automatically obtain an IP address from the network DHCP server. The default IP address will be replaced by the assigned IP address from the DHCP server. After you click **Apply**, a message informs you that when the DHCP client is enabled the current IP address will be lost and you will need to find the new IP obtained from the DHCP server.

IP Address	Enter a static IP address to the switch from the subnet address range that the network is using. If the DHCP Client option is enabled, the switch is configured as a DHCP client. The network DHCP server will assign the IP address to the switch and the switch displays it in this column. The default IP address is 192.168.1.88. You can also choose an IP address manually when the DHCP Client option is disabled.
Subnet Mask	Enter the subnet mask of the IP address. You need to specify the subnet mask if the DHCP Client option is disabled.
Gateway	Enter the network gateway for the switch. You need to specify the gateway if the DHCP Client option is disabled. The default gateway address is 192.168.1.254.
DNS1	Enter the primary DNS IP address.
DNS2	Enter the secondary DNS IP address.
Apply	Click to apply the settings.

6.4.5 Syslog

Syslog Configuration

The Syslog (system event log) may be sent to the client only, server only, or both the client and server. The type of events that are issued to the client or server depends on the system event selection on the System Alert - Event page (see “System Alert Event”).

To configure the Syslog, choose **System**-->**Syslog**-->**Configuration**.

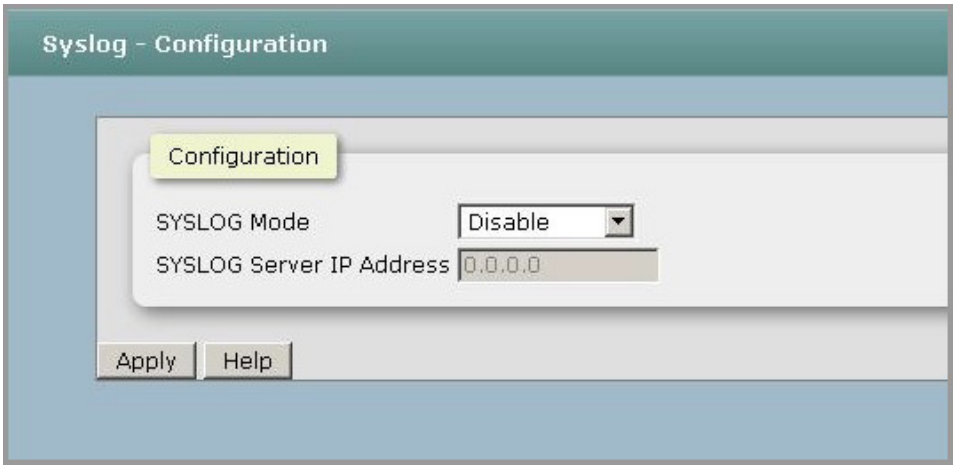


Figure 28 Syslog Configuration Page

Syslog Mode	Select the system log mode: • **Client Only**—The system event log will only be sent to this interface of the switch. • **Server Only**—The system event log will only be sent to the remote system log server with its IP address assigned. • **Both**—The system event log will be sent to the remote server and this interface. • **Disable**—No system event log is generated or sent.
Syslog Server IP Address	When the Syslog Mode option is set as “Server Only” or “Both,” enter the system log server IP address to which the log will be sent.
Apply	Click to apply the settings.

Syslog Log

To display the current system event log (Figure 29), choose **System**-->**Syslog**-->**Log**. Click **Reload** or press **F5** to refresh the page to view the most recent events.

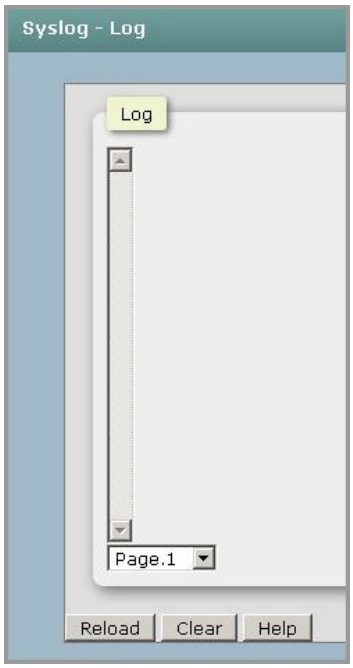


Figure 29 Log Page

Reload	Reloads the current log.
Clear	Clears the log contents.

6.4.6 SNMP

SNMP Agent

Simple Network Management Protocol (SNMP) is the protocol developed to manage nodes (for example, servers, workstations, routers, switches and hubs) on an IP network. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth. Network management systems learn of problems by receiving traps or change notices from network devices implementing SNMP.

To configure SNMP agent settings, choose **System**-->**SNMP**-->**Agent**.

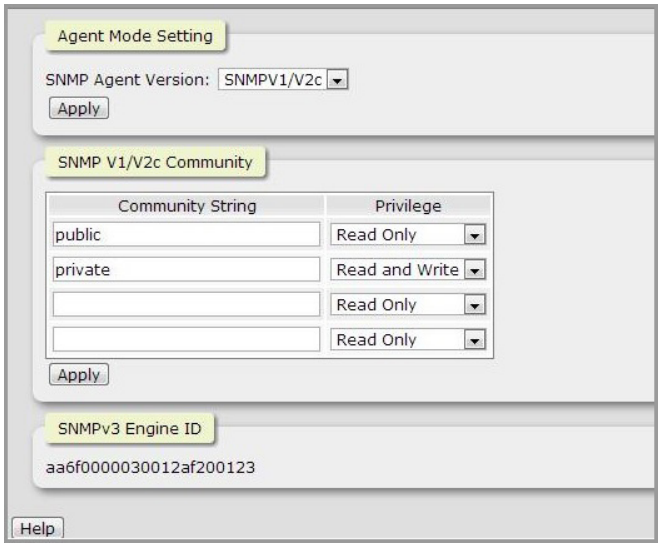


Figure 30 SNMP Agent Configuration

Agent Mode	Select the SNMP version (V1/V2c or V3) that you want to use. And then click **Apply** to switch to the selected SNMP version mode.
SNMP V1/V2c Community	Allows you to define the new community string set and remove the unwanted community string.
Community String	Enter the name string.
Privilege	**Read Only**—Enables requests accompanied by this community string to display MIB-object information. **Read and Write**—Enables requests accompanied by this community string to display MIB-object information and to set MIB objects.
SNMPv3 Engine ID	SNMPv3 engine ID value of the entity hosting the management information. Each SNMPv3 agent has an engine ID that uniquely identifies the agent in the device and also provides unique identification of the MIB objects within a domain. In SNMPv3 communication, the engine ID is used as an identifier for an agent among different agents.
Apply	Click to apply the settings.

SNMP Trap Configuration

A trap manager is a management station that receives the SNMP trap messages generated by the switch. If no trap manager is defined, no traps will be issued.

To configure a trap manager, choose **System**-->**SNMP**-->**Trap**. Assign an IP address, enter the SNMP community strings, and select the SNMP trap version.

SNMP Trap supports the following events.

Generic-Traps:

- Link up trap
- Link down trap
- Cold start trap
- Authentication failure

Private/Specific Traps:

- DC power status trap

- Digital input trap
- Topology change trap

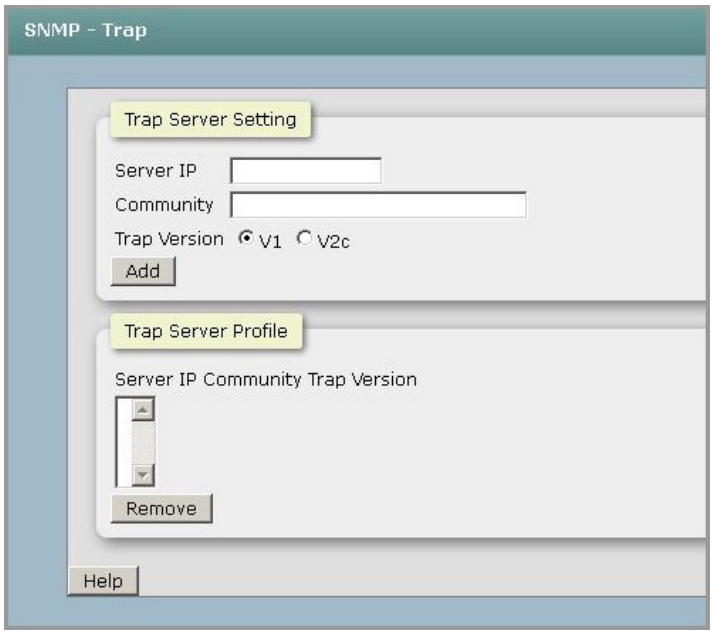


Figure 31 SNMP - Trap (Trap Manager)

Server IP	Enter the IP address of the trap manager.
Community	Enter the community string for the trap station.
Trap Version	Select the SNMP trap version type—v1 or v2c.
Add	Click to apply the settings.
Remove	To remove the community string, select the community string listed in the current manager's field and click **Remove**.

SNMPv3

Version 3 of SNMP includes new security and administration features and capabilities unique to this version.

The new security features include:

- **Confidentiality**—Packet encryption prevents snooping by an unauthorized source.
- **Integrity**—Message integrity ensures that a packet has not been tampered with while in transit. This includes an optional packet replay protection mechanism.
- **Authentication**—Verfies that the message is from a valid source.

The new administration features include:

- Authorization and view-based access control
- Logical contexts
- Usernames and key management
- Remotely configurable via SNMP operations

To configure the switch to use SNMP version 3, choose **System**-->**SNMP**-->**SNMPv3**.

The **Context** tab allows you to configure the SNMPv3 context table. An SNMPv3 context is a collection of

management information items that can be accessed by an SNMPv3 entity. A context is identified by the SNMPv3 engine ID value of the entity hosting the management information (this can be found in System-->SNMP-->Agent) and a context name that identifies the specific context.

An item of management information may exist in more than one context. An SNMP entity potentially has access to many contexts. In other words, if an item of management information has been defined under a certain context by an SNMPv3 entity, any management application can access that information by providing that context name.

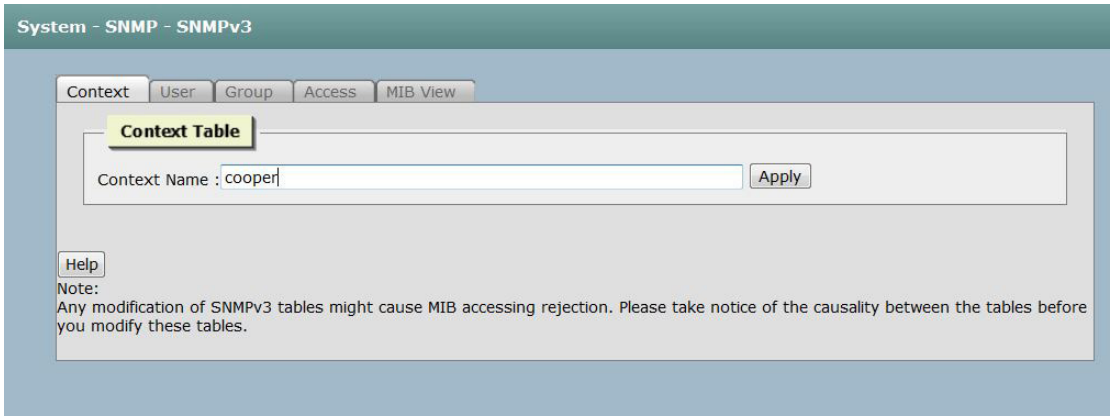


Figure 32 SNMPv3 Context Tab

Context Name	Enter a name for the context table.
Apply	Click to apply the setting.

The User tab allows you to add a user profile or remove an existing user profile.

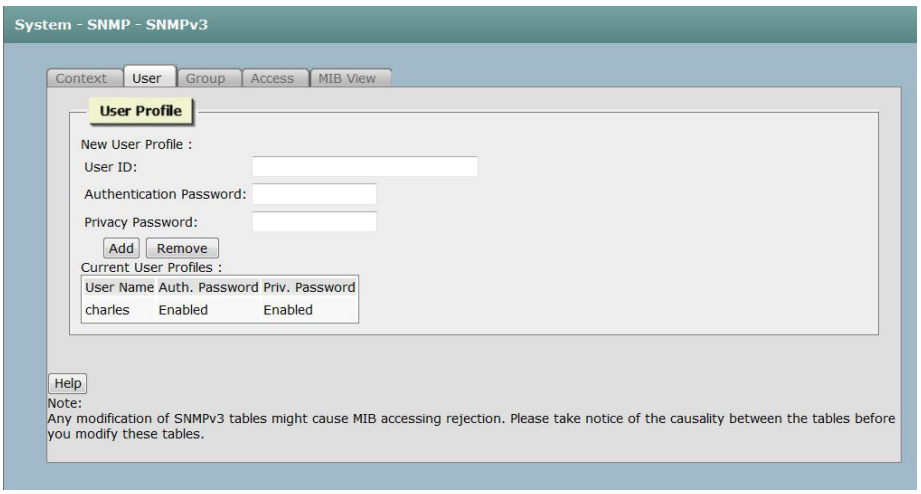


Figure 33 SNMPv3 User Tab

User ID	Enter the name of the new user profile.
Authentication Password	Enter the password to be used to authenticate the user who is accessing the context.
Privacy Password	Enter the password to be used as a key to encrypt the packets.
Add	Adds the new user.
Remove	Removes an existing user profile. Enter the user's user ID, authentication password, and privacy password, and then click Remove.

Use the Group tab to configure the SNMPv3 group table The group name created in this tab is associated with the user ID. Both the group name and the user ID are used as parameters to create entries in the access table that appears in the Access tab.

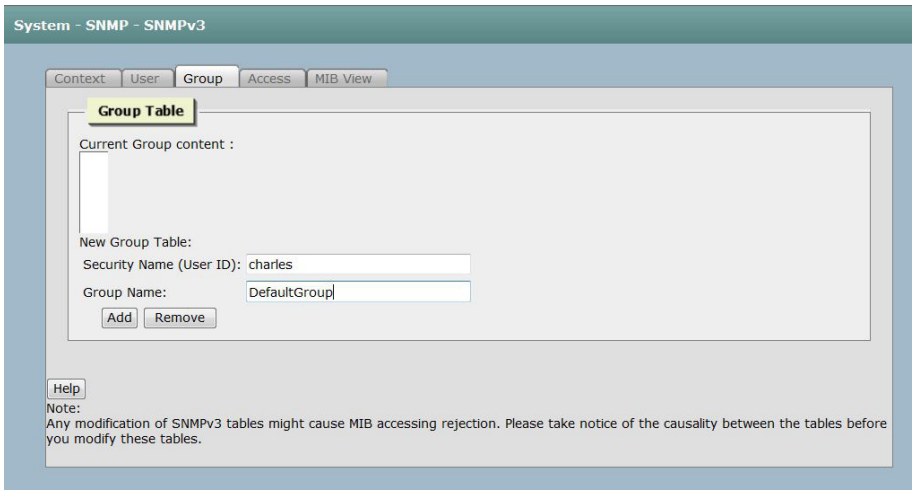


Figure 34 SNMPv3 Group Tab

Current Group Content	List of existing groups (and their associated user IDs). To remove a group, select the group and click Remove.
Security Name (User ID)	User name of the user to be added to the group or removed from the group. This must be a user name that you have set up in the User tab.
Group Name	Name of the group to which the user is to be added.
Add	Adds the user to the group.
Remove	Removes the group name (associated with a user) currently selected in the Current Group Content field.

Use the Access tab to configure the SNMPv3 access table. The entries in this table define different access profiles. Each access profile can be identified by its context prefix and group name. An access profile is associated with a security level, context matching rule, and names of read, write, and modify MIB views. An MIB view can be created in the MIB View tab.

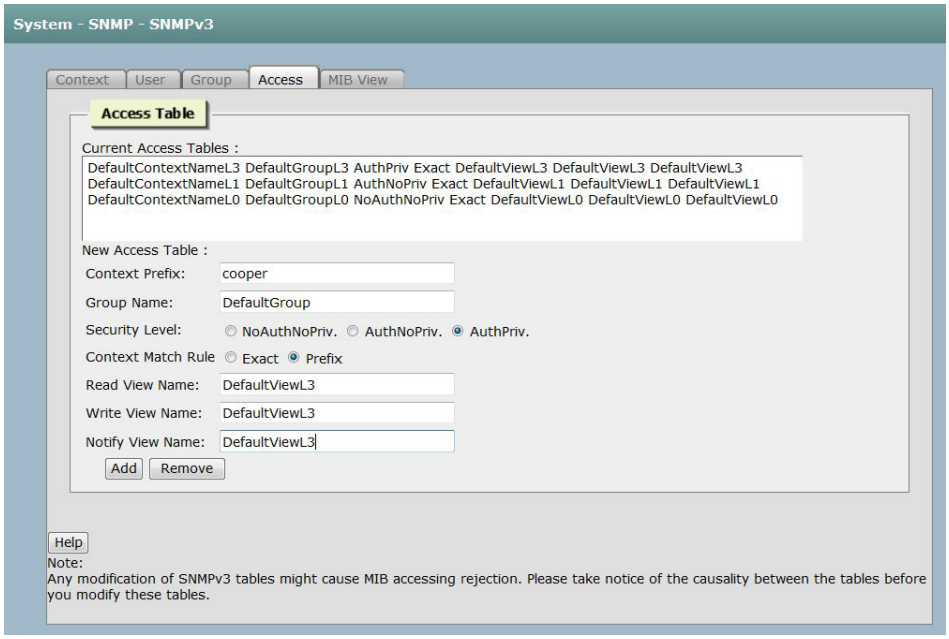

System - SNMP - SNMPv3
Context
User
Group
Access
MIB View
Access Table
Current Access Tables :
DefaultContextNameL3 DefaultGroupL3 AuthPriv Exact DefaultViewL3 DefaultViewL3 DefaultViewL3
DefaultContextNameL1 DefaultGroupL1 AuthNoPriv Exact DefaultViewL1 DefaultViewL1 DefaultViewL1
DefaultContextNameL0 DefaultGroupL0 NoAuthNoPriv Exact DefaultViewL0 DefaultViewL0 DefaultViewL0
New Access Table :
Context Prefix: cooper
Group Name: DefaultGroup
Security Level: NoAuthNoPriv. AuthNoPriv. AuthPriv.
Context Match Rule Exact Prefix
Read View Name: DefaultViewL3
Write View Name: DefaultViewL3
Notify View Name: DefaultViewL3
Add
Remove
Help
Note:
Any modification of SNMPv3 tables might cause MIB accessing rejection. Please take notice of the causality between the tables before you modify these tables.

Figure 35 SNMPv3 Access Tab

Current Access Tables — Lists the existing access table profiles.

Context Prefix — Enter the context prefix to be used to identify the context name.

Group Name — Enter the group name associated with this access profile.

Security Level — Select a security level for users of the access profile:

- **NoAuthNoPriv**—User is not authenticated. Packets are not encrypted.
- **AuthNoPriv**—User is authenticated. Packets are not encrypted.
- **AuthPriv**—User is authenticated. Packets are encrypted.

Context Match Rule — Select the rule that will apply to a context match:

- **Exact**—Context name of a request must match the context prefix to access MIB views defined in this access profile.
- **Prefix**—Initial substring of the context name of a request must match the context prefix value to access MIB views defined in this access profile.

Read View Name — Enter the name of the MIB view defining the MIB objects for which read access is requested. If here is no Read View Name, read access is not granted. MIB views are defined in the MIB View tab.

Write View Name — Enter the name of MIB view defining the MIB objects for which write access is requested. If there is no Write View Name, write access is not granted. MIB views are defined in the MIB View tab.

Notify View Name — Enter the name of the MIB view defining the MIB objects which may be included in a notification request. MIB views are defined in the MIB View Tab.

Add	Adds the new access profile.
Remove	Removes the access profile selected in the Current Access Tables list.

Use the MIB View tab to configure the management information base (MIB) table.

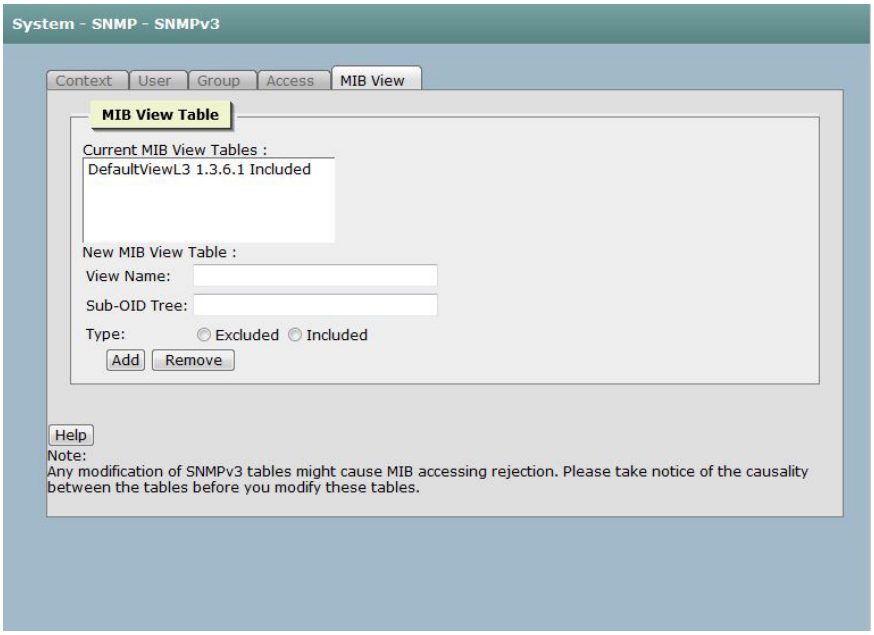


Figure 36 SNMPv3 MIB View Tab

Current MIB Tables	Lists the existing MIB views.
View Name	Enter the name of the MIB view to be added (or removed).
Sub-OID Tree	Enter the OID defining the root of the subtree to which the view will be included or excluded.
Type	Select whether the sub-OID tree should be included with or excluded from the named view.
Add	Adds the new MIB view.
Remove	Removes the MIB view selected in the Current MIB Tables list.

6.4.7 System Alert

System Alert Relay Alarm

The Fault Relay Alarm function provides power failure and port link down/broken detection. To configure this function, choose **System**-->**System Alert**-->**Relay Alarm**.

For the power failure settings, if the power input 1 and power input 2 are installed and the checkboxes for PWR 1 and PWR 2 are selected the fault LED on the front panel will turn on when a power failure occurs.

For the Port Link Down/Broken setting, if the checkbox for a port is selected the fault LED will turn on when that port fails. See “3.5 Wiring the Fault Alarm Contact” for information on failure detection.

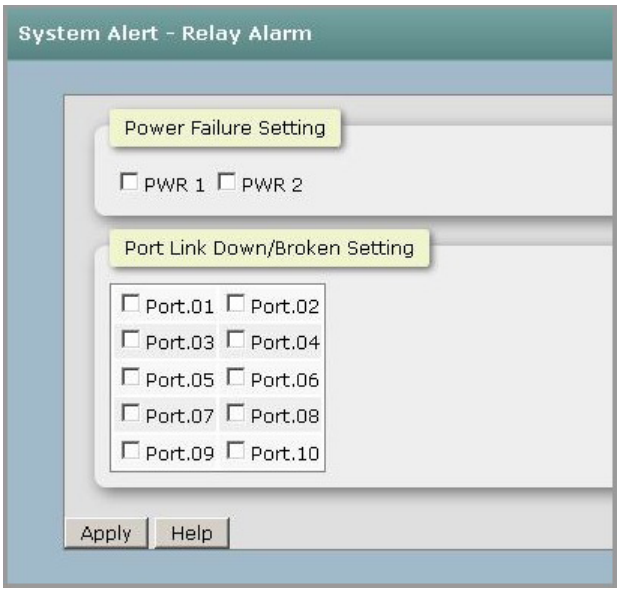


Figure 37 System Alert - Relay Alarm (Fault Relay Alarm)

Power Failure Setting	Select the checkbox if you want the fault LED indicator on the panel to turn on when power fails.
Port Link Down/ Broken Setting	Select the port checkbox if you want the fault LED on the panel to turn on when the port link is down or broken.
Apply	Click to apply the setting.

System Alert Event

If the Syslog Mode is enabled on the Syslog Configuration page (see “6.4.5 Syslog”) you can use the System Alert-Event page to select which whether system restart, power status, and SNMP authentication failure events are sent to the Syslog server.

To display this page, choose **System**-->**System Alert**-->**Event**.

NOTE If you also want the port event log to be sent to the Syslog server, be sure to set the triggers (link up, link down, and both) in the Port Alert page (see “Port Alert”).

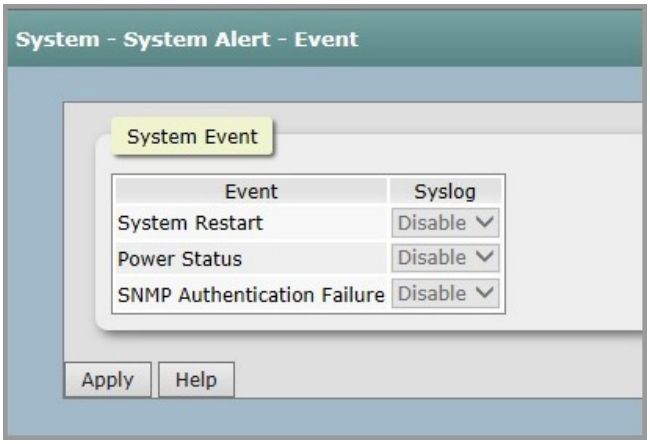
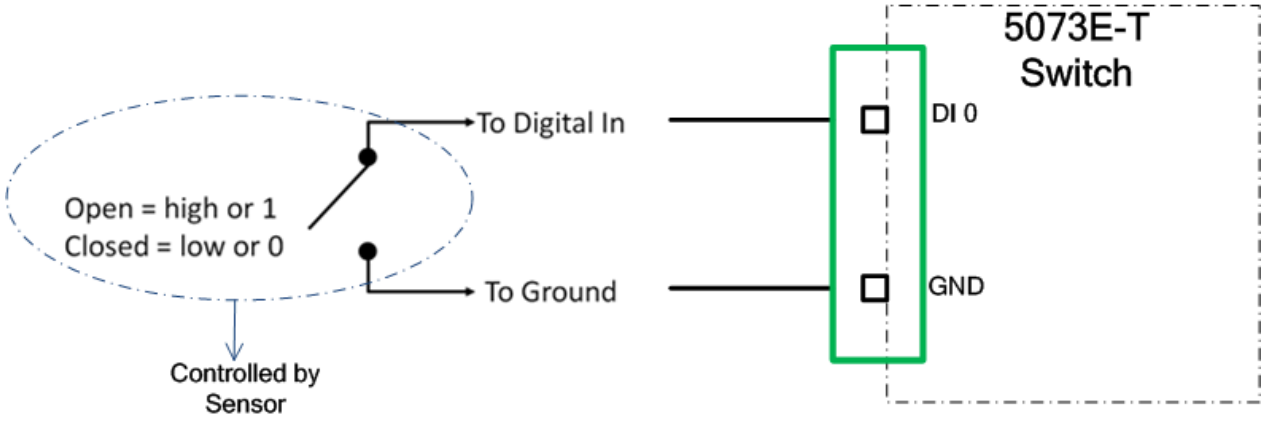


Figure 38 System Alert - Event

System Restart	When enabled, the system will issue an alert to the system log server when the device executes a cold start. It may take a minute after the cold start before the event appears in the system log server.
Power Status	When enabled, the system will issue an alert to the system log server when input power to the switch becomes unstable.
SNMP Authentication Failure	When enabled, the system will issue an alert to the system log server when SNMP authentication fails.
Apply	Click to apply the setting.

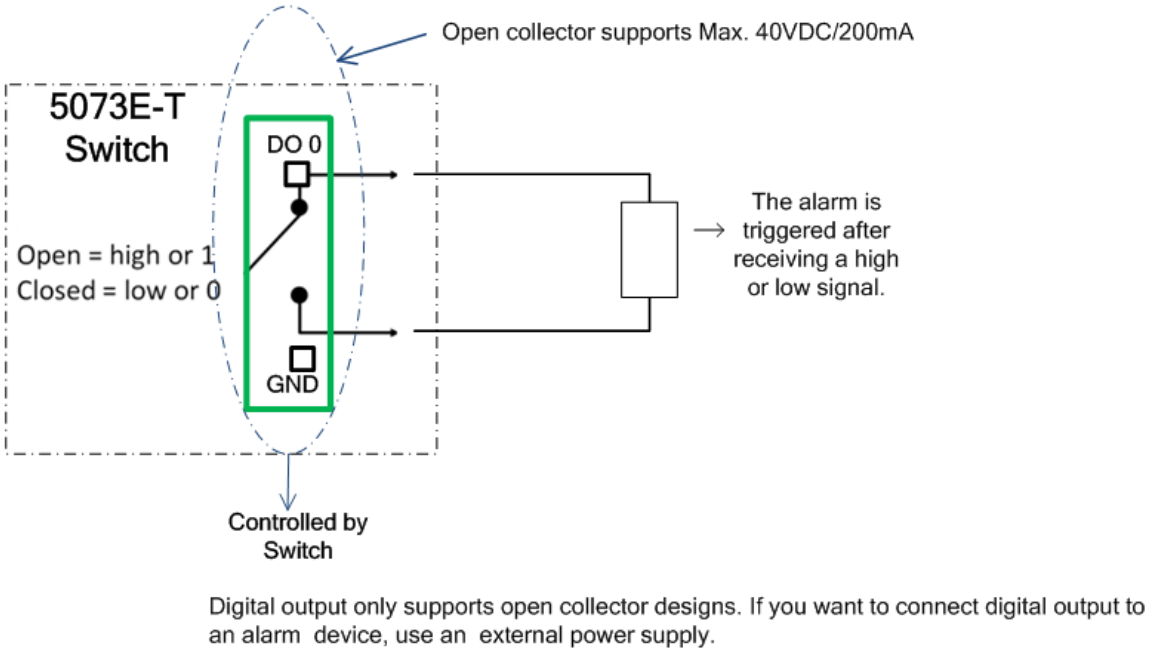
Digital Input/Digital Output

The 5073E-T Switch contains two digital outputs and two digital inputs. Outputs are open-collector transistor switches that may be controlled by the host computer. They provide control signals, which can be applied to heaters, pumps, and other electrical equipment. The digital inputs may be read by the host computer and used to detect the state of a remote digital signal.



- High Status : Keep in open status or 10~30VDC (with external power).
- Low Status : Keep in close status or -30~2VDC (with external power).

Figure 39 Digital Input



Digital output only supports open collector designs. If you want to connect digital output to an alarm device, use an external power supply.

Figure 40 Digital Output

To set digital input and digital output triggers, choose **System**-->**System Alert**-->**DIDO** to display the following page.

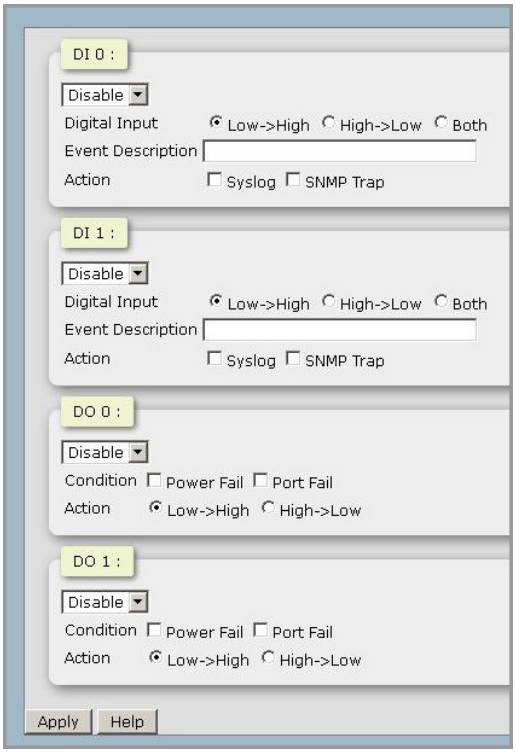


Figure 41 Digital Input/Output Trigger Setting

Digital Input Setting Enabling DI0 makes the first digital input available. Enabling DI1 makes the second digital input available.

Digital Input	Choose the transition type to trigger DI0 or DI1: • **Low-->High**—When this option is selected, DI0/DI1 will only report the status when the voltage of the external device changes from low to high. • **High-->Low**—When this option is selected, DI0/DI1 will only report the status when the voltage of the external device changes from high to low. • **Both**—When this option is selected, DI0/DI1 will report both the status when the voltage of the external device changes from high to low or low to high.
Event description	Enter a description for the event. **NOTE If you do not specify an event description, events in response to the trigger will not appear in the Syslog.**
Action	Select the Action checkboxes to send the events via Syslog, or SNMP Trap.
Digital Output Setting	Enabling DO0 makes the first digital output (DO0) available. Enabling DO1 makes the second digital output (DO1) available.
Condition	Select the checkboxes to specify whether events are sent via digital output for port fail, power fail, or both.
Action	Choose the transition type: • **Low-->High**—When switch receive the event about port fail or power fail, DO0/DO1 will switch the output voltage from low to high. • **High-->Low**—When switch receive the event about port fail or power fail, DO0/DO1 will switch the output voltage from high to low.

6.4.8 DHCP Server

Dynamic Host Configuration Protocol (DHCP) is a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address each time it connects to the network. In some systems, the device IP address can change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. Dynamic addressing simplifies network administration because the software keeps track of IP addresses rather than requiring an administrator to manage the task. This means that a new computer can be added to a network without manually assigning it a unique IP address.

DHCP Server Configuration

To configure the switch as a DHCP server, choose **System**-->**DHCP Server**-->**Server Configuration**.

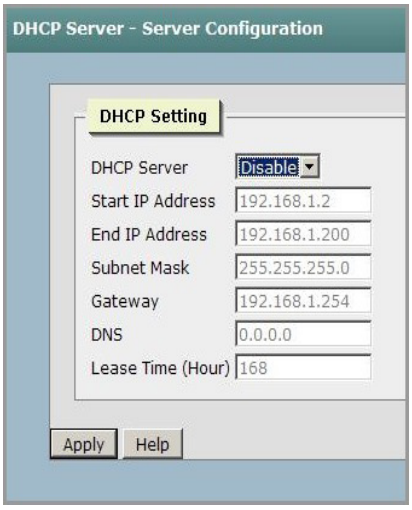


Figure 42 DHCP Server Configuration

DHCP Server	Enable or disable the DHCP server function on the switch. When enabled, the switch will be the DHCP server on your local network.
Start IP Address	Enter the IP address that is the beginning of the dynamic IP address range. For example, if the dynamic IP address is between 192.168.1.100 and 192.168.1.200, the start IP address would be 192.168.1.100.
End IP Address	Enter the IP address that is the end of the dynamic IP address range. For example, if the dynamic IP address is between 192.168.1.100 and 192.168.1.200, the end IP address would be 192.168.1.200.
Subnet Mask	Enter the subnet mask of the IP configuration.
Gateway	Enter the IP address of the gateway in your network.
DNS	Enter the domain name server IP address in your network.
Lease Time (Hour)	Enter the number of hours after which the client will reset the dynamic IP address.
Apply	Click to apply the settings.

DHCP Server Client Table

When the DHCP server function is enabled, the system will collect the DHCP client information including the assigned IP address, the MAC address of the client device, the IP assigning type, status, and lease time.

To view the DHCP server client table, choose **System**-->**DHCP Server**-->**Client Table**.

Figure 43 Client Table

DHCP Server IP Binding

You can specify (bind) an IP address for each port. When the device connects to the port and requests an IP address, the system will assign the IP address that is bound with the port.

To configure IP address binding, choose **System**-->**DHCP Server**-->**IP Binding**.

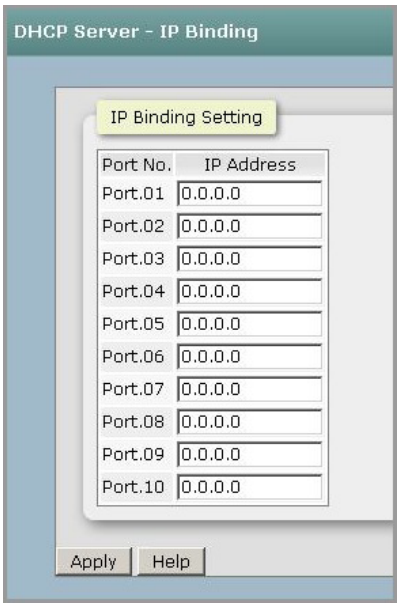


Figure 44 IP Binding

Apply Click to apply the setting.

6.5 Configure Menu

6.5.1 Port

Port Configuration

To configure the settings of each port to control the connection parameters, choose **Configure**-->**Port**-->**Configuration**. The status of each port is listed at the bottom of the page.

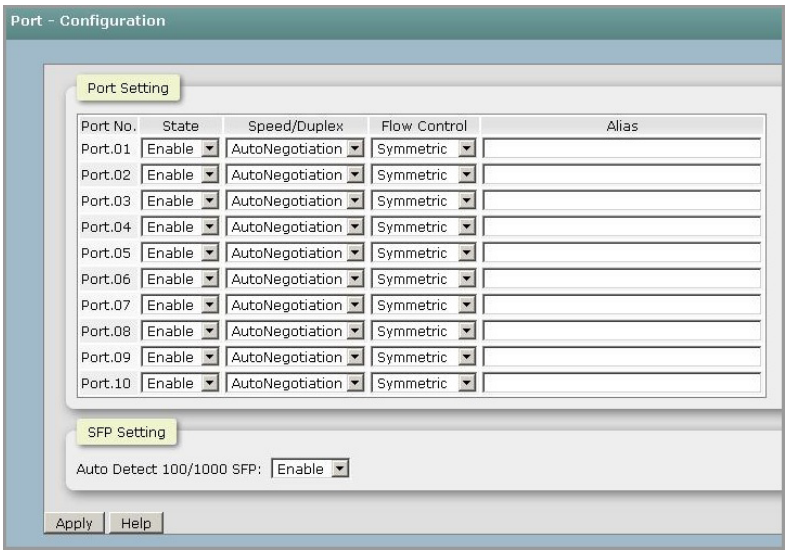


Figure 45 Port Configuration

State Allows you to enable or disable the port. When the port is disabled, it will not receive or transmit packets.

Speed/Duplex	You can choose a port speed setting, or choose Auto Negotiation for the port to negotiate the speed. The port speed options vary depending on the port. For port 1-6 and port 8, the options are 100 FULL, 100 HALF, 10 FULL and 10 HALF. For port 7, 9, and 10, the options are 1000 FULL, 1000 HALF, 100 FULL, 100 HALF, 10 FULL, and10 HALF.
	NOTE The Speed/Duplex option applies only to the RJ-45 interface.
Flow Control	Flow control determines whether the receiving node sends feedback to the sending node. Three options are available: • **Disable**—Disables flow control capability. • **Symmetric**—Flow control is determined by auto-negotiation, and is only used when both linked ports have flow control enabled. • **Asymmetric**—Flow control is always active, regardless of whether the linked partner port is enabled.
Alias	Allows you to add a description to let the manager know what device is connected to the port.
Auto Detect 100/1000	When enabled, automatically detects the SFP module speed of the SFP port.
Apply	Click to apply the settings.

Port Status

The Port Status page displays the status of port configuration settings. To display this page, choose Configure-->**Port**-->**Status**.

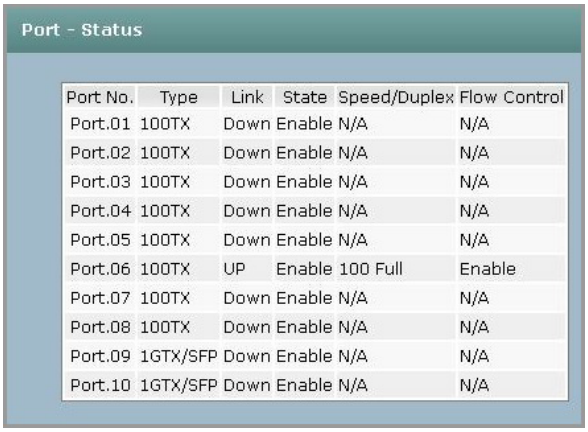
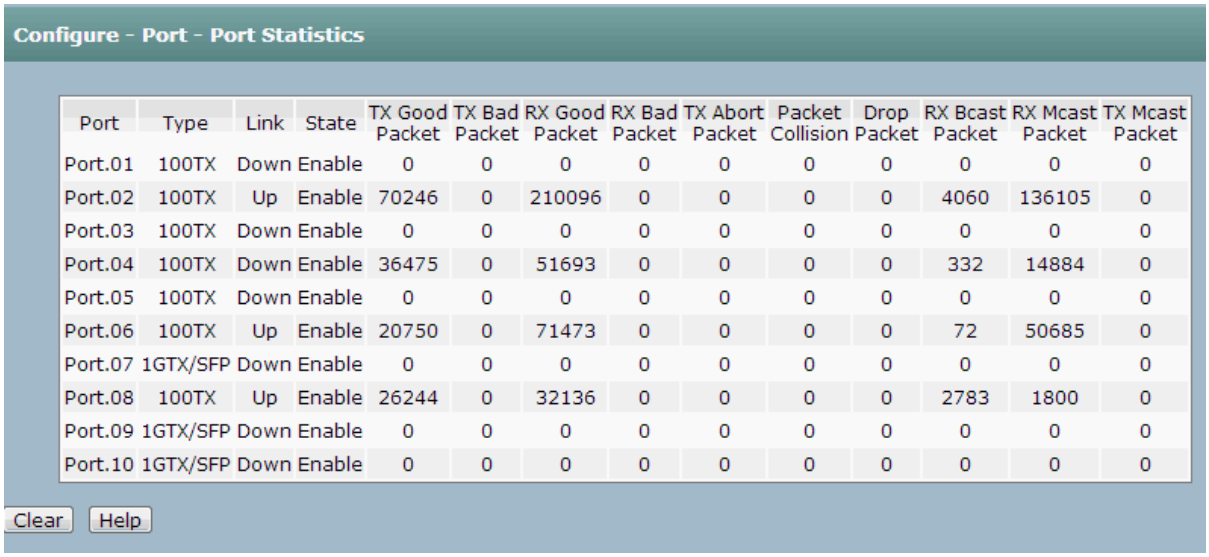

Port - Status
Port No. Type Link State Speed/Duplex Flow Control
Port.01 100TX Down Enable N/A N/A
Port.02 100TX Down Enable N/A N/A
Port.03 100TX Down Enable N/A N/A
Port.04 100TX Down Enable N/A N/A
Port.05 100TX Down Enable N/A N/A
Port.06 100TX UP Enable 100 Full Enable
Port.07 100TX Down Enable N/A N/A
Port.08 100TX Down Enable N/A N/A
Port.09 1GTX/SFP Down Enable N/A N/A
Port.10 1GTX/SFP Down Enable N/A N/A

Figure 46 Port Status

Port Statistics

The Port Statistics page displays the real-time packet transfer status for each port. You can use this information to plan and implement the network, or to troubleshoot a problem when there are collisions or heavy traffic.

To display port statistics, choose **Configure**-->**Port**-->**Port Statistics**.



Port	Type	Link	State	TX Good Packet	TX Bad Packet	RX Good Packet	RX Bad Packet	TX Abort Packet	Packet Collision	Drop Packet	RX Bcast Packet	RX Mcast Packet	TX Mcast Packet
Port.01	100TX	Down	Enable	0	0	0	0	0	0	0	0	0	0
Port.02	100TX	Up	Enable	70246	0	210096	0	0	0	0	4060	136105	0
Port.03	100TX	Down	Enable	0	0	0	0	0	0	0	0	0	0
Port.04	100TX	Down	Enable	36475	0	51693	0	0	0	0	332	14884	0
Port.05	100TX	Down	Enable	0	0	0	0	0	0	0	0	0	0
Port.06	100TX	Up	Enable	20750	0	71473	0	0	0	0	72	50685	0
Port.07	1GTX/SFP	Down	Enable	0	0	0	0	0	0	0	0	0	0
Port.08	100TX	Up	Enable	26244	0	32136	0	0	0	0	2783	1800	0
Port.09	1GTX/SFP	Down	Enable	0	0	0	0	0	0	0	0	0	0
Port.10	1GTX/SFP	Down	Enable	0	0	0	0	0	0	0	0	0	0

Figure 47 Port Statistics

Port Port number.

Type Displays the current speed of connection to the port.

Link Current link status:

Up—Link is operational.
Down—Link is not operational.

State State set on the Port Configuration page (see “6.5.1 Port”). When the state is disabled, the port will not transmit or receive packets.

TX Good Packet Number of good packets transmitted via this port.

TX Bad Packet Number of bad packets transmitted via this port. Bad packets include undersized packets (less than 64 octets), oversized packets, CRC errors, fragments, and jabber packets.

RX Good Packet Number of good packets received via this port.

RX Bad Packet Number of bad packets received by this port. Bad packets include undersized packets (less than 64 octets), oversized packets, CRC errors, fragments, and jabber packets.

TX Abort Packet Number of packets aborted during transmission.

Packet Collision Number of packet collisions.

Packet Dropped Number of dropped packets.

RX Bcast Packet Number of broadcast packets received.

RX Mcast Packet Number of multicast packet received.

TX Mcast Packet Number of multicast packet transmitted.

Clear Click to clear all counts.

Port Alert

If the Syslog Mode is enabled on the Syslog Configuration page (see “6.4.5 Syslog”) the event log will be sent to the system log server. If you also want the port event log to be sent to the system log server, you need to set the triggers (link up, link down, and both) in the Port Alert page.
To display this page, choose **Configure**-->**Port**-->**Port Alert**.

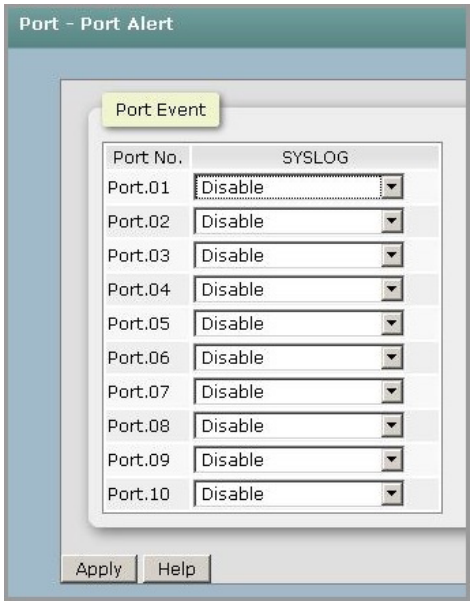


Figure 48 Port Alert

Port Event For the Port Event menus to become available, the "Client Only" option in Syslog Configuration must be enabled (see "6.4.5 Syslog").

There are four port event options:

- **Link Up**—The system will only issue a log message when the link-up event occurs for the port.
- **Link Down**—The system will only issue a log message when the link-down event occurs for the port.
- **Link Up & Link Down**—The system will issue a log message at the time when the port connection is link-up or link-down.
- **Disable**—No event will be sent to the system log.

Apply Click to apply the setting.

6.5.2 Rate Control

Rate Limit

You can set the bandwidth rate and frame limitation type for each port. To display this page, choose **Configure**-->**Rate Control**-->**Rate Limit**.

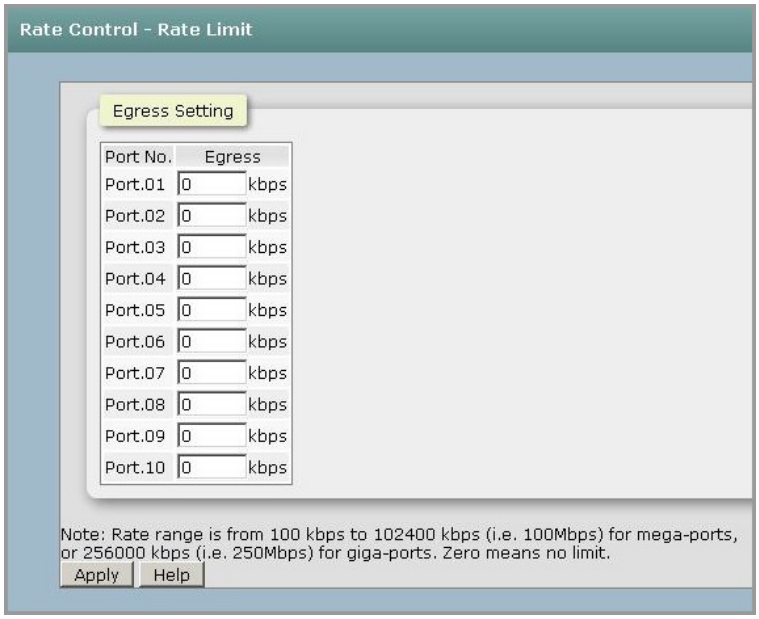


Figure 49 Rate Limit

Egress Setting Allows you to set the egress rate limit (in kbps) for each port. Note that 1 Mbps is equal to 1024 kbps. The range is from 100 kbps to 102400 kbps (100 Mbps) for mega-ports, or 256000 kbps (250 Mbps) for giga-ports. Zero indicates no egress rate limit.

Apply Click to apply the settings.

Storm Control

Use this page to set the ingress rate limit and select what kind of frames are to be filtered by the ingress rate limit. To display this page, choose **Configure**-->**Rate Control**-->**Storm Control**.

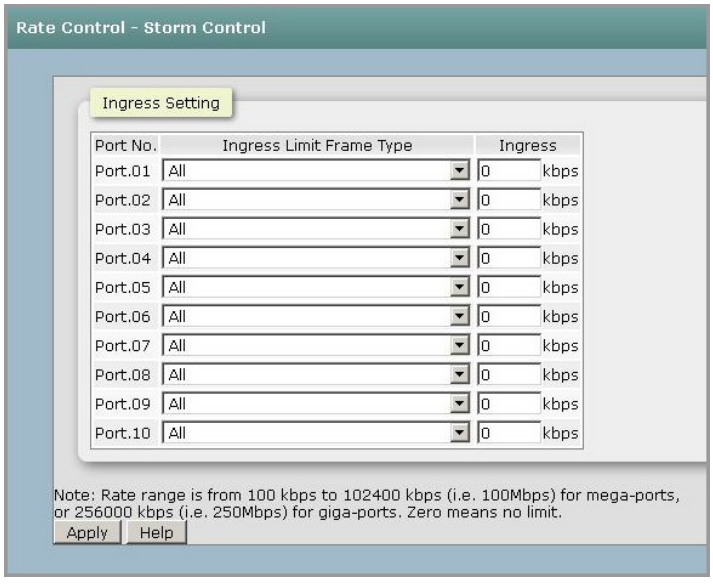

Rate Control - Storm Control
Ingress Setting
Port No.
Ingress Limit Frame Type
Ingress
Port.01 All 0 kbps
Port.02 All 0 kbps
Port.03 All 0 kbps
Port.04 All 0 kbps
Port.05 All 0 kbps
Port.06 All 0 kbps
Port.07 All 0 kbps
Port.08 All 0 kbps
Port.09 All 0 kbps
Port.10 All 0 kbps
Note: Rate range is from 100 kbps to 102400 kbps (i.e. 100Mbps) for mega-ports, or 256000 kbps (i.e. 250Mbps) for giga-ports. Zero means no limit.
Apply
Help

Figure 50 Storm Control

Ingress Limit Frame Type

Select the frame type to be filtered:

- All
- Broadcast/Multicast/Flooded Unicast
- Broadcast/Multicast
- Broadcast only

Broadcast/Multicast/Flooded Unicast, Broadcast/Multicast, and Broadcast only types are only for ingress frames. The egress rate only supports the “All” type.

Ingress

Set the ingress rate limit, in kbps. (One Mbps is equal to 1024 kbps.) The rate range is from 100 kbps to 102400 kbps (100 Mbps) for mega-ports, or 256000 kbps (250 Mbps) for giga-ports. Zero indicates no ingress rate limit.

Apply

Click to apply the settings.

6.5.3 Aggregation

Aggregation Configuration

Port trunking is the combination of several ports or network cables to expand the connection speed beyond the limits of any single port or network cable. Link Aggregation Control Protocol (LACP), is a protocol running on layer 2 that provides a standardized means (in accordance with IEEE 802.3ad) to bundle several physical ports together to form a single logical channel. All the ports within the logical channel (logical aggregation) work at the same connection speed. LACP operation requires full-duplex mode.

To configure port aggregation, choose **Configure**-->**Aggregation**-->**Configuration**.

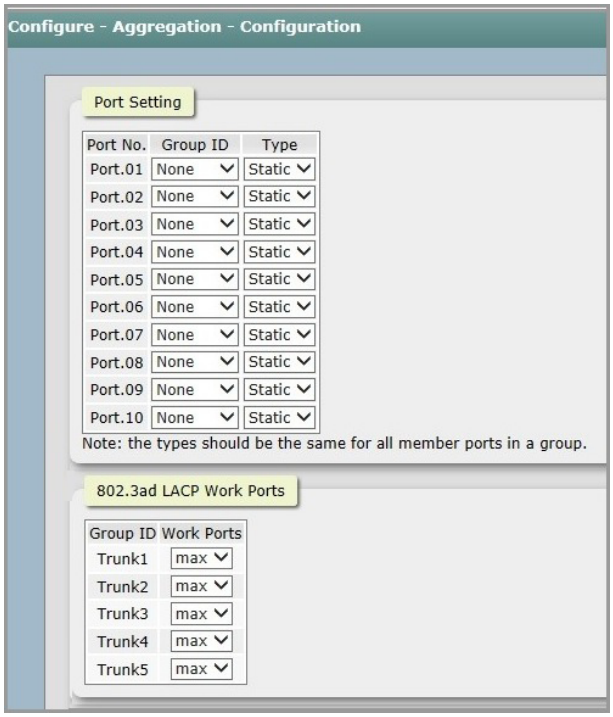


Figure 51 Aggregation Configuration

Group ID

Select the trunk group to which the port is to be assigned (Trunk1, Trunk2, Trunk3, Trunk4, or Trunk5), or select “None” if you do not want the port assigned to any trunk group. The default Group ID is “None.”

Type Select the trunk group type for the port (Static or LACP).

- **Static**—When Static is selected as the trunk group type for a port, the port belongs to the trunk group whose ID is selected in Group ID drop down menu for that port. Static trunk groups are only allowed to aggregate traffic in two to four ports.

  When ports belong to a static trunk, the traffic in the trunk group is distributed evenly among the ports belonging to the trunk group. No protocol handshake is necessary between the 5073E-T Switch and the ports.

- **LACP**—When LACP is selected as the trunk group type for a port, the port belongs to the trunk group whose ID is selected in Group ID drop down menu for that port. LACP trunk groups are only allowed to aggregate traffic in two to four ports.

  The number of ports that carry traffic in LACP trunk is determined by the Group ID Work Port drop down menu for that trunk. The number of ports that carry traffic should be less than or equal to the number of ports selected for that LACP trunk.

  If the number of work ports selected for the LACP trunk is less than the number of ports that belong to the LACP trunk, the non-working port(s) will remain idle and in standby. In this configuration, if a working port fails, one of the non-working ports will be brought in to carry traffic in place of the failed working port. The 5073E-T Switch uses IEEE 802.3ad LACP protocol to negotiate an agreement with its member ports.

Work Ports This menu only applies to LACP trunks. Work Ports allow you to choose the total number of ports that are used to carry packet traffic.

Apply Click to apply the settings.

Aggregation Status

The Aggregation Status page displays the current port aggregation settings. To display this page, choose Configure-->**Aggregation**-->**Status**.

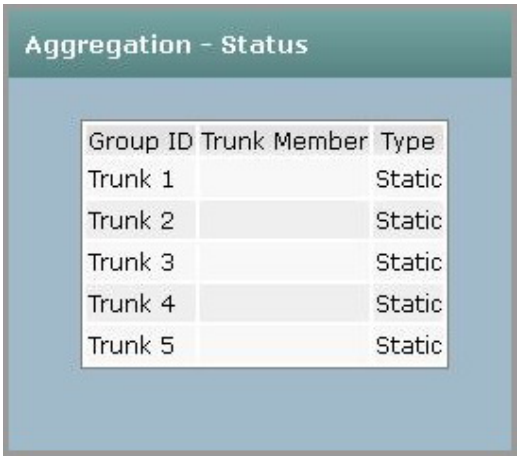


Figure 52 Aggregation Status

6.5.4 Spanning Tree

Rapid Spanning Tree Protocol (RSTP) is an evolution of the Spanning Tree Protocol (STP) and provides faster spanning tree convergence after a topology change. The system also supports STP, and will auto-detect whether the connected device is running STP or RSTP protocol.

RSTP Settings

The Spanning Tree - RSTP Settings page provides the bridge and port configuration interface for RSTP. You can assign a higher or lower priority to each port. When RSTP is enabled, the port with the higher priority is in the forwarding state and other ports are blocked to make certain there is no loop in the LAN.

To configure RSTP settings, choose **Configure**-->**Spanning Tree**-->**RSTP Settings**.

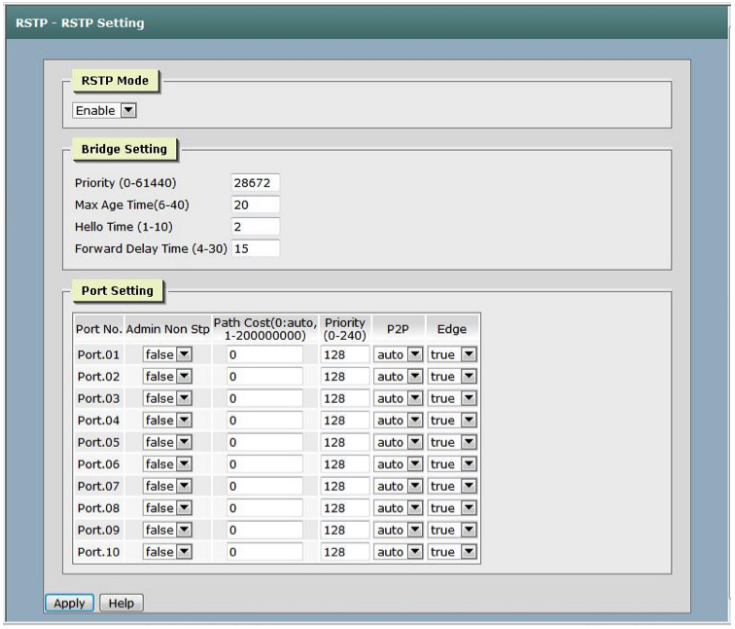

RSTP - RSTP Setting
RSTP Mode
Enable
Bridge Setting
Priority (0-61440) 28672
Max Age Time(6-40) 20
Hello Time (1-10) 2
Forward Delay Time (4-30) 15
Port Setting
Port No. Admin Non Stp Path Cost(0:auto, 1-200000000) Priority (0-240) P2P Edge
Port.01 false 0 128 auto true
Port.02 false 0 128 auto true
Port.03 false 0 128 auto true
Port.04 false 0 128 auto true
Port.05 false 0 128 auto true
Port.06 false 0 128 auto true
Port.07 false 0 128 auto true
Port.08 false 0 128 auto true
Port.09 false 0 128 auto true
Port.10 false 0 128 auto true
Apply
Help

Figure 53 RSTP Setting

RSTP Mode	Enable or disable the RSTP function. When enabled, you can set the configuration fields on this page.
Priority	Enter a priority value for the switch. Within the network, the switch assigned the lowest value will have the highest priority and is selected as the root switch. If you change the value, you will need to reboot the switch. The value must be a multiple of 4096 according to the protocol standard rule. The root switch is responsible for recovering the backup path when it finds that switch connections have been broken for a period.
Max Age	Enter the number of seconds that this device waits before checking to see if it should change to a different state. Enter a value from 6 to 40.
Hello Time	Enter the time interval (in seconds) at which the switch sends out the BPDU packet to check the RSTP status. Enter a value from 1 to 10.
Forward Delay Time	Enter the number of seconds that a port waits before changing from its Rapid Spanning-Tree Protocol learning and listening states to the forwarding state. Enter a value from 4 to 30.
Admin Non STP	Select the port that you do not want enabled with RSTP.
Path Cost	Enter a number from 1 to 200,000,000 to indicate how suitable this port is as a node for the Spanning Tree topology. A lower value indicates greater suitability.
Priority	Decide which port should be blocked by setting its priority as the lowest. Enter a number from 0 to 240 that is a multiple of 16. For example, 0,16, or 32.

P2P

The rapid state transitions possible within RSTP depend on whether the port concerned can only be connected to a specific bridge (it is served by a point-to-point LAN segment), or can be connected to two or more bridges (it is served by a shared medium LAN segment).

This function allows the P2P (point-to-point) status of the link to be manipulated administratively. Select from the following settings:

- **True**—The port is to be regarded as a point-to-point link.
- **False**—The port is to be regarded as a shared link.
- **Auto**—The link type is to be determined by the auto-negotiation between the two peers.

Edge

The edge port is directly connected to end stations and will not create a bridging loop in the network.

- **True**—Configures the port as an edge port.
- **False**—Configures the port as a non-edge port.

Apply

Click to apply the settings.

RSTP Information

To display the port and switch information for RSTP, choose **Configure**-->**Spanning Tree**-->**RSTP Information**.

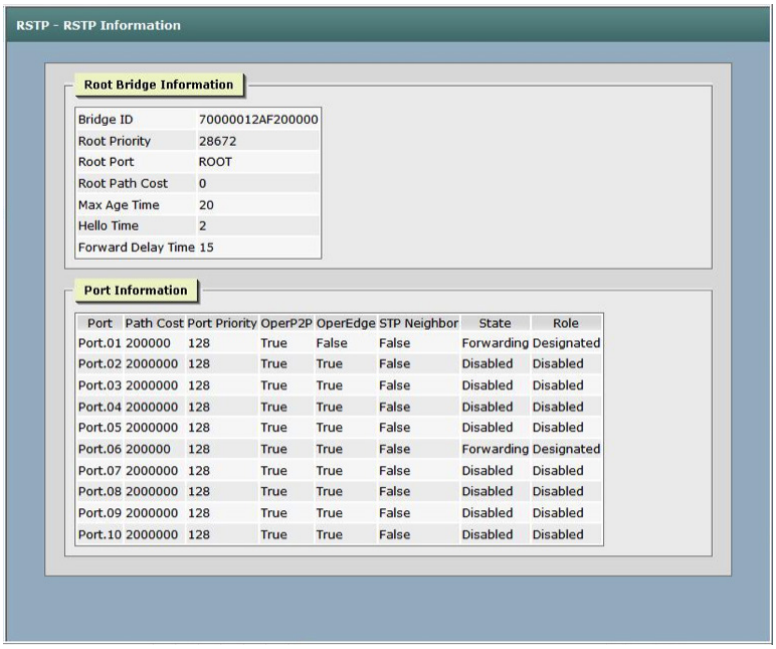

RSTP - RSTP Information
Root Bridge Information
Bridge ID 70000012AF200000
Root Priority 28672
Root Port ROOT
Root Path Cost 0
Max Age Time 20
Hello Time 2
Forward Delay Time 15
Port Information
Port Path Cost Port Priority OperP2P OperEdge STP Neighbor State Role
Port.01 200000 128 True False False Forwarding Designated
Port.02 2000000 128 True True False Disabled Disabled
Port.03 2000000 128 True True False Disabled Disabled
Port.04 2000000 128 True True False Disabled Disabled
Port.05 2000000 128 True True False Disabled Disabled
Port.06 200000 128 True True False Forwarding Designated
Port.07 2000000 128 True True False Disabled Disabled
Port.08 2000000 128 True True False Disabled Disabled
Port.09 2000000 128 True True False Disabled Disabled
Port.10 2000000 128 True True False Disabled Disabled

Figure 54 RSTP Information

Bridge ID

The root switch is determined by bridge ID. The switch with the lowest bridge ID will become the root switch. The bridge ID is a combination of the bridge priority number (which is configurable) and the MAC address of the switch. For example, in the bridge ID “32768.0200.0000.1111,” the bridge priority number is “32768” and the switch MAC address is “0200.0000.1111.” The bridge priority default is 32768, and can only be configured in multiples of 4096.

Root Priority

The bridge priority of the switch determined to be the root switch.

Root Port	The port used to connect to the Root switch. This port has the lowest root path cost.
Root Path Cost	Indicates how suitable this port is as a node for the Spanning Tree topology. A lower value indicates greater suitability.
Max Age Time	The number of seconds that this device waits before checking to see if it should change to a different state.
Hello Time	The time interval (in seconds) at which the switch sends out the BPDU packet to check the RSTP status.
Forward Delay Time	The number of seconds a port waits before changing from Rapid Spanning Tree Protocol learning and listening states to the forwarding state.

6.5.5 Redundancy - Pro-Ring2se

To configure Pro-Ring2se function on the 5073E-T Switch, choose **Configure**-->**Redundancy**-->**Pro-Ring2se**. For examples of Pro-Ring2se connection options, see “4.1 Pro-Ring2se Application.”

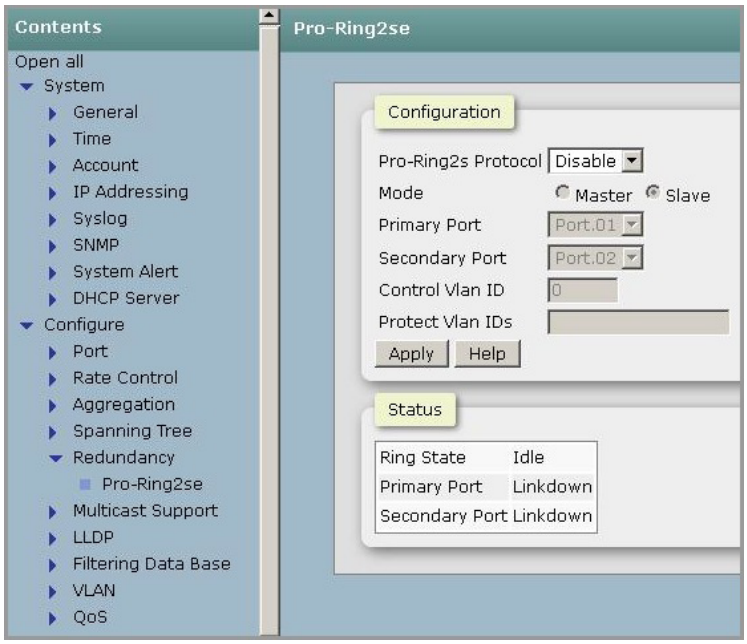


Figure 55 Pro-Ring2se

Pro-Ring2se Protocol	Enable or disable the Pro-Ring2se function.
Mode Master/Slave	At least one switch must play the role of ring master switch in a ring topology. The ring master switch is responsible for checking the connections in a ring topology. Checking ring connections is performed by sending a BPDU packet every 10 ms across the ring from master switch.

NOTE Additional switches can take the role of master switch. In this case, multiple switches can be redundant with each other. However, it is recommended that you not set too many switches as master switch because resources are consumed to negotiate the selection of the primary master switch.

Primary Port
Secondary port

Any two ports from a switch can be chosen to build the ring topology.

NOTE Although any two ports of switch can be chosen for this option, the selected ports must be equipped with the same speed and the same type of interface as other switches in the same ring. For example, if port 1 and port 2 with a speed of 10/100 TX are chosen, the ring ports of other switches in the same ring must be 10/100 TX.

Control VLAN ID

Because the Pro-Ring2se master switch generates BPDU packets every 10 ms to check the connection status, and the same BPDU packet is used by other switches to find a target switch, it is better to isolate the BPDU packets used for checking connection status from those used for other purposes. The best way to resolve this is to use VLAN for isolating the BPDU packets. The default Control VLAN ID for the connection status checking is set to "1" if you do not use VLAN. If there is another need to use VLAN ID 1, you can set a unique VLAN ID for this field.

NOTE This is a required field.

Protect VLAN IDs

This field is used if the system requires a trunk VLAN ID for communicating with other switches. If not, the default value is "1." This option lets the switch know what VLAN group will be isolated with Control VLAN. Enter all VLAN group IDs in this column, except the control VLAN ID.

NOTE This is a required field.

Status

Shows the current status of ring ports.

Ring State:

- **Complete**—The switch has Pro-Ring2se topology enabled, and the cable is installed.
- **Linkdown**—One or two of the port links are down.
- **Idle**—The switch is configured with Pro-Ring2se topology.

Primary Port:

- **Linkup**—This ring port is connected to another switch's ring port, and is functioning okay.
- **Linkdown**—This ring port has no connection.
- **Blocking**—This ring port is dedicated to use the backup path.

Secondary Port:

Same as Primary Port. If disabling Pro-Ring2se after enabling redundancy, the setting of VLAN will not be cleared, the "disable Pro-Ring2se" will not affect the original VLAN operation.

6.5.6 Multicast Support

The Internet Group Management Protocol (IGMP) is an internal protocol of the Internet Protocol (IP) that manages multicast traffic by using switches, routers, and hosts that support IGMP. Enabling IGMP allows the ports to detect IGMP queries, report packets, and manage IP multicast traffic through the switch. IGMP has three fundamental types of messages, as shown in the following table.

Message	Description
Query	A message sent from the querier (IGMP router or switch) asking for a response from each host belonging to the multicast group.
Report	A message sent by a host to the querier to indicate that the host wants to be or is already a member of a given group indicated in the report message.

Message	Description
Leave Group	A message sent by a host to the querier to indicate that the host has quit being a member of a specific multicast group.

IGMP Snooping

If the switch supports IP multicast, you can enable the IGMP protocol. To display this page, choose **Configure**-->**Multicast Support**-->**IGMP Snooping**. When IGMP Snooping is enabled, the IGMP snooping information displays on the page. IP multicast addresses range from 224.0.0.0 through 239.255.255.255.

NOTE There must be at least one switch that is enabled for IGMP query in your network. All other switches must enable IGMP snooping.

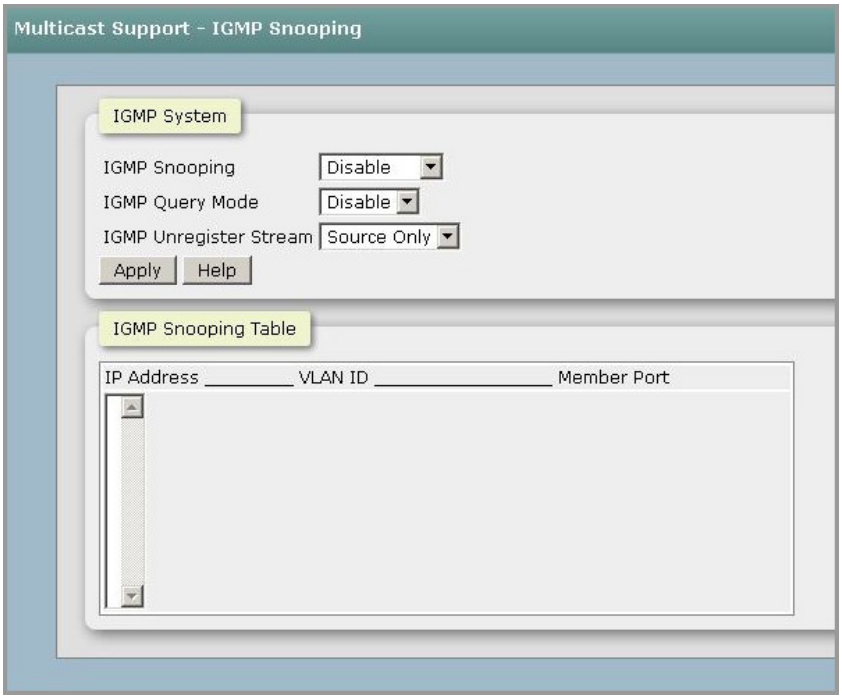


Figure 56 IGMP Snooping

IGMP Snooping — Enable or disable the IGMP protocol.

IGMP Query — Enable or disable the IGMP query function. The IGMP query information will be displayed in IGMP status section.

IGMP Unregister Stream — Specify how the switch should process the IGMP unregistered stream:

- **Source Only**—IGMP unregister stream packets are sent to the source port from which those packets were received.
- **Blocking**—IGMP Unregister Stream packets are dropped.
- **Flooding**—IGMP Unregister Stream packets are sent to all ports.

Apply — Click to apply the settings.

Static Filtering

Multicasts are similar to broadcasts in that they are sent to all end stations on a LAN or VLAN. With multicast filtering, end stations can receive multicast traffic if the connected ports are included in the specified multicast groups, and network devices only forward multicast traffic to the ports that are connected to the registered end stations.

To configure filtering, choose **Configure**-->**Multicast Support**-->**Static Filtering**.

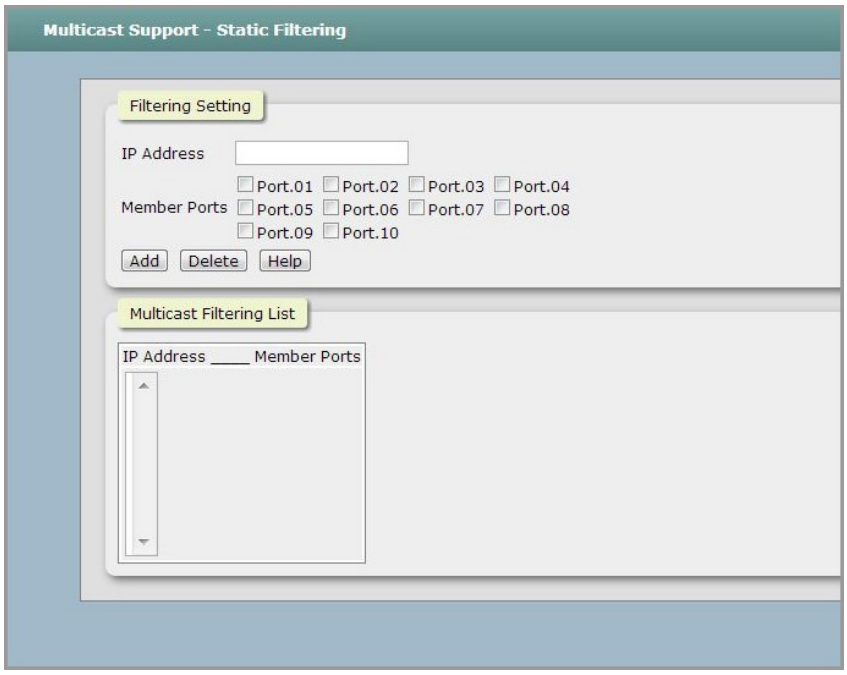


Figure 57 Static Filtering

IP Address	Assign a multicast group IP address in the range 224.0.0.0 to 239.255.255.255.
Member Ports	Select the port checkbox to include the port as a member in the specified multicast group IP address.
Add	Click to add the address to the multicast filtering list.
Delete	Click to remove a selected filter.

6.5.7 LLDP

Link Layer Discovery Protocol (LLDP) is defined in the IEEE802.1AB, and is an emerging standard that provides a solution for the configuration issues caused by expanding LANs. LLDP specifically defines a standard method for Ethernet network devices, such as switches, routers and wireless LAN access points, to advertise information about themselves to other nodes on the network and store the information they discover. LLDP runs on all 802 media. The protocol runs over the data-link layer only, allowing two systems running different network layer protocols to learn about each other.

LLDP Configuration

To configure LLDP, choose **Configure**-->**LLDP**-->**LLDP Configuration**.

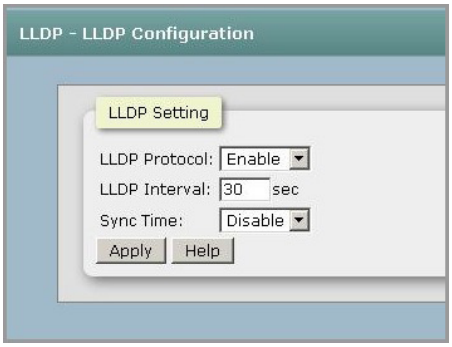


Figure 58 LLDP Configuration

LLDP Protocol	Enable or disable the LLDP function.
LLDP Interval	Set the interval (in seconds) for advertising the switch information to other nodes.
Sync Time	Enables or disables switch clock synchronization using LLDP.
Apply	Click to apply the settings.

LLDP Neighbors

The LLDP Neighbors page displays information about the port neighbors discovered using the LLDP protocol. To display this page, choose **Configure**-->**LLDP**-->**LLDP Neighbors**.

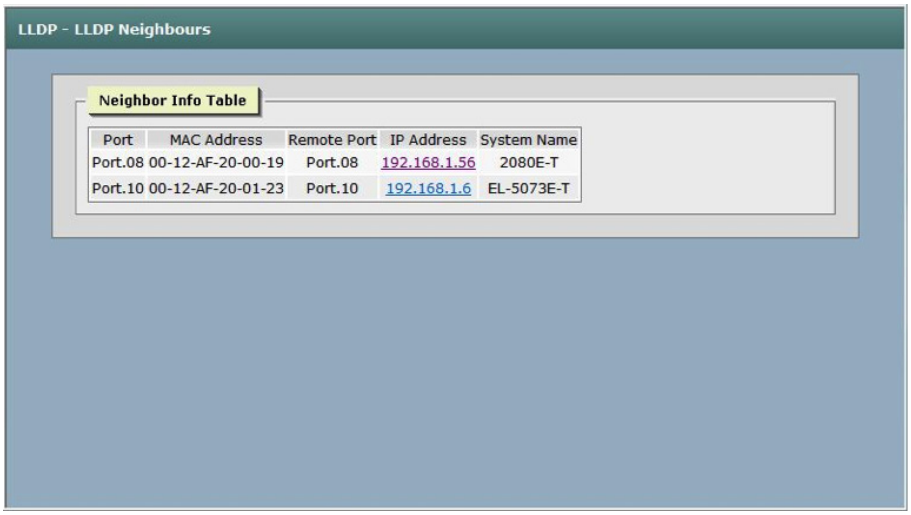

LLDP - LLDP Neighbours
Neighbor Info Table
Port MAC Address Remote Port IP Address System Name
Port.08 00-12-AF-20-00-19 Port.08 192.168.1.56 2080E-T
Port.10 00-12-AF-20-01-23 Port.10 192.168.1.6 EL-5073E-T

Figure 59 LLDP Neighbors

6.5.8 Filtering Data Base

Filtering Data Base Configuration

To configure the filtering data base, choose **Configure**-->**Filtering Data Base**-->**Configuration**.

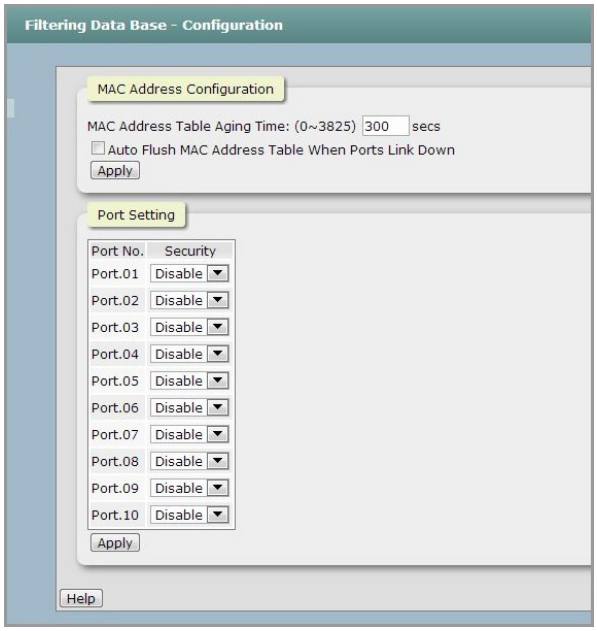


Figure 60 Filtering Data Base - Configuration

MAC Address Configuration	Set the aging time (in seconds) for the MAC address table. Select the Auto Flush checkbox if you want the MAC address table to be erased if the port link fails.
Security	Enable or disable secure learning mode. When enabled, only static MAC addresses are learned; all other frames are dropped.

NOTE Before enabling security, make sure that the link used for managing the switch is added to the Static MAC Table otherwise the management link will be lost and can only be restored by using another non-secure port or by connecting to the switch via the serial interface.

Apply	Click to apply the settings.

Dynamic MAC Table

To monitor the learning status of the MAC address table associated with a port, choose **Configure**-->**Filtering Data Base**-->**Dynamic MAC Table**. The MAC address table lists the addresses of the devices that the port has "learned" are connected to it. Clicking **Clear MAC Table** will delete current list, requiring that the port re-learn the MAC addresses of its devices and rebuild the table.

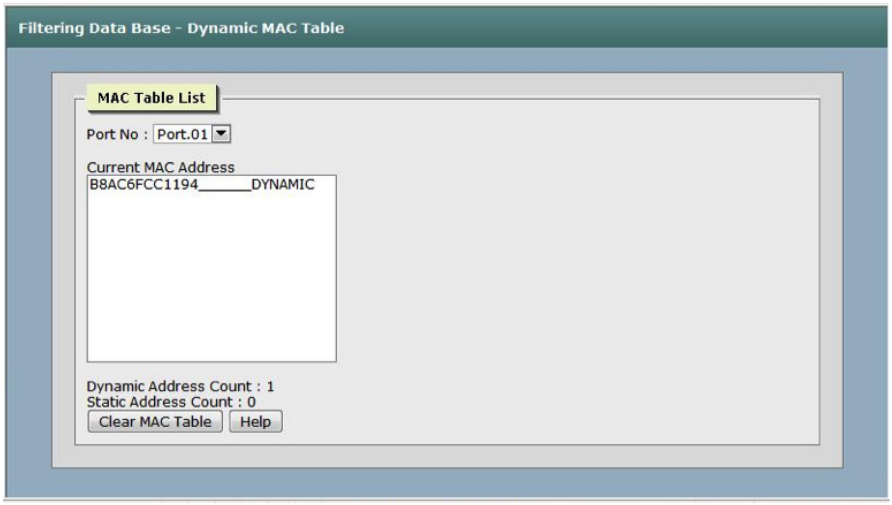


Figure 61 Filtering Data Base - Dynamic MAC Table

Port No.	Select a port to view its MAC address table.
Current MAC Address	Lists the MAC addresses of the devices connected to the selected port.
Clear MAC Table	Clears the MAC address table. The port will need to re-learn the addresses of devices connected to it and rebuild the MAC address table.

6.5.9 VLAN

A virtual LAN (VLAN) is a logical network group that limits the broadcast domain and allows you to isolate network traffic so that members of the same VLAN only receive traffic from each other. Creating a VLAN on a switch is the logical equivalent of reconnecting a group of network devices to another Layer 2 switch. However, all the network devices are still physically plugged into the same switch.

VLAN Configuration

To configure VLAN, choose **Configure**-->**VLAN**-->**VLAN Configuration**. The 5073E-T Switch supports two VLAN modes—802.1Q (tagged-based) VLAN, and port-based VLAN. These modes are described on the following pages. By default, VLAN operation is disabled.

802.1Q VLAN Mode—If you choose 802.1Q VLAN mode (Figure 62), you can see the link type, untagged VID, and tagged VID information of each port.

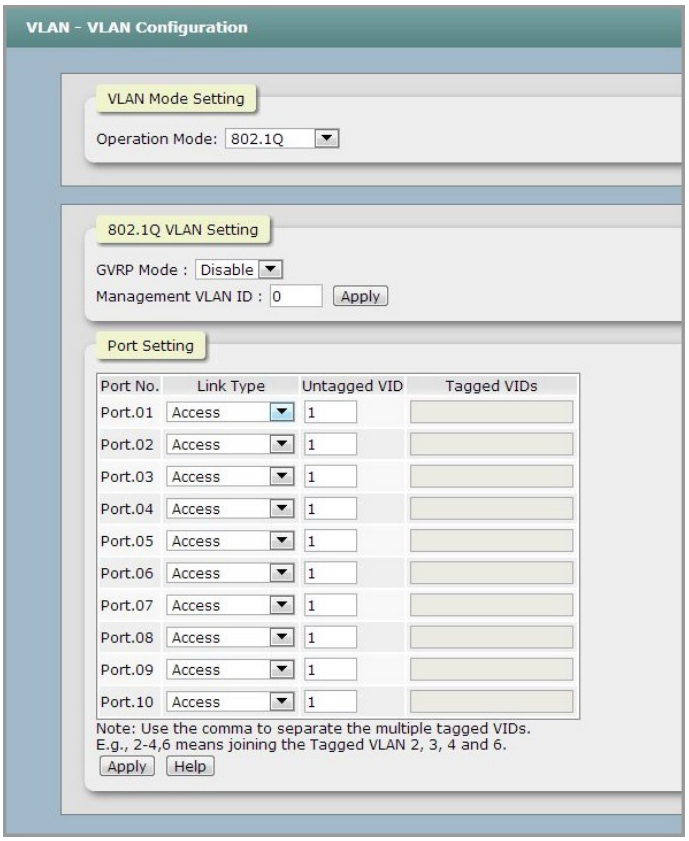


Figure 62 VLAN Configuration - 802.1Q VLAN

Operation Mode Select the VLAN operation mode, or disable VLAN. The following fields appear when you choose 802.1Q VLAN mode.

GVRP mode GARP VLAN Registration Protocol or Generic VLAN Registration Protocol (GVRP) is a protocol that facilitates control of virtual local area networks (VLANs) within a larger network. GVRP conforms to the IEEE 802.1Q specification, which defines a method of tagging frames with VLAN configuration data. This allows network devices to dynamically exchange VLAN configuration information with other devices.

Management LAN ID Set the VLAN group that can access the switch (only ports with this VLAN ID can access the switch). The default “0” means devices on all ports can access the switch.

Link Type There are four link types to choose from:

- **Access Link**—This link type only supports untagged VID. The access link is a segment that provides the link path for one or more stations to the VLAN-aware device. An access port (untagged port), connected to the access link, has an untagged VID (also called PVID). When an untagged frame is received by the access port, the switch inserts a four-byte tag into the frame. The contents of the last 12-bits of the tag is untagged VID. When this frame is sent out through any of the access ports of the same PVID, the switch will remove the tag from the frame to restore it to what it was. Ports with the same untagged VID are regarded as members of the same VLAN group.

NOTE Because the access port does understand a tagged frame, the column field of Tagged VID is not available.

- **IQ Trunk Link**—This link type only supports multiple tagged VIDs. The IQ trunk link is a segment that provides the link path for one or more VLAN-aware devices (switches). A trunk port, connected to the trunk link, has an understanding of tagged frame, which is used for communication among VLANs across switches. Which frames of the specified VIDs will be forwarded depends on the values filled in the Tagged VID column field. Use a comma to separate two VIDs.

  NOTE A trunk port does not insert a tag into an untagged frame, and therefore the untagged VID column field is not available. It is not necessary to type "1" in the tagged VID. The trunk port will forward the frames of VLAN 1. The trunk port must be connected to a trunk/hybrid port on the other switch. The tagged VID of the two ports must be the same.

- **Hybrid Link**—This link type supports untagged VID and multiple tagged VIDs. The hybrid link is a segment that consists of access and trunk links. The hybrid port has the features of both access and trunk ports. A hybrid port has a PVID belonging to a particular VLAN, and also forwards the specified tagged frames across switches for the purpose of VLAN communication.

- **Hybrid Link (QinQ)**—(Double Tag VLAN) Link is segment that consists of Hybrid QinQ Double Tag VLAN access and trunk links. QinQ is the technique also known as provider bridging, Stacked VLANs.

  The original 802.1Q VLAN specification allows a single Virtual Local Area Network (VLAN) header to be inserted into an Ethernet frame. QinQ allows multiple VLAN headers to be inserted into a single frame, an essential capability for implementing Metro Ethernet network topologies.

  In Metro Ethernet networks, fewer IP v4 addresses are used by using QinQ. A QinQ type VLAN can save IPv4 addresses by populating groups of sub-VLANs in a VLAN and utilizing the default gateway IP address of Double Tag VLAN sharing the same IP subnet mask.

  Double Tag VLAN in Layer 2 also provides enhanced security between customers that are served by the same default gateway by segregating between the sub-VLANs even when they are located in the same LAN and have the same IP subnet mask.

  In a multiple VLAN header context, out of convenience the term "VLAN tag" or just "tag" for short is often used in place of "802.1Q VLAN header". QinQ allows multiple VLAN tags in an Ethernet frame; together these tags constitute a tag stack. When used in the context of an Ethernet frame, a QinQ frame is a frame that has two VLAN 802.1Q headers (double-tagged).

  NOTE It is not necessary to type '1' in the tagged VID. The hybrid port will forward the frames of VLAN 1. The trunk port must be connected to a trunk/ hybrid port of the other switch. Both the tagged VID of the two ports need to be the same.

Untagged VID	Assigns an untagged VID to the port. This field is available when the Link Type is set to Access Link or Hybrid Link. Enter a number between 1 and 4094.
Tagged VID	Assigns a tagged VID to the port. This field is available when the Link Type is set to Trunk Link or Hybrid Link. Enter a number between 1 and 4094.
Apply	Click to apply the settings.

Port Based VLAN Mode—Port Based VLAN mode provides a simple way to create a VLAN. To create a new port based VLAN, first choose “Port Based” in the Operation Mode field (see Figure 63), and then click Add. The screen now looks like Figure 64. Simply name the VLAN, assign a VLAN ID, and select the ports to be included in the VLAN.

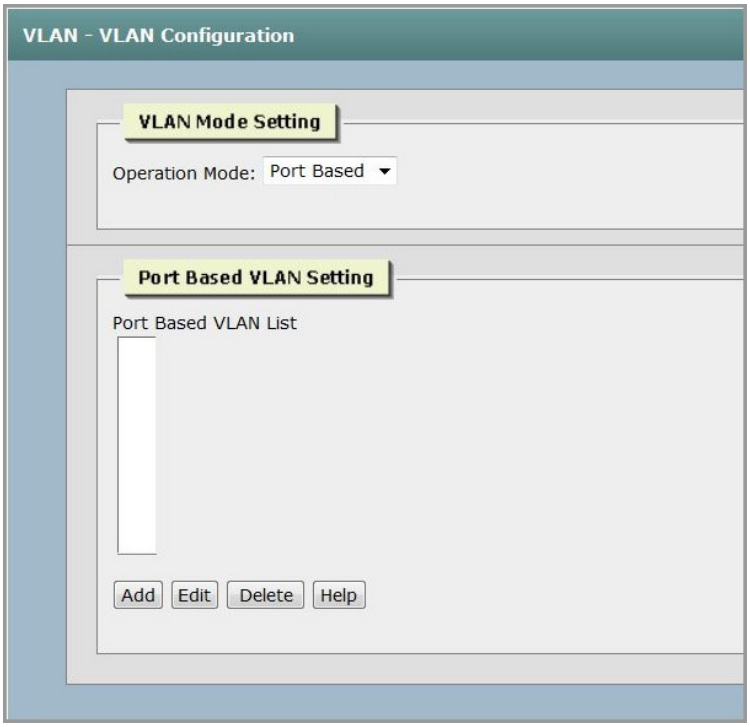


Figure 63 VLAN Configuration - Port-based VLAN (Step 1)

Operation Mode	Select “Port Based” to create a port based VLAN.
Add	Click to add a new port based VLAN. The screen in Figure 64 appears, where you can configure the new VLAN.
Edit	To edit a VLAN, click the VLAN name in the list and click Edit. The screen in Figure 64 appears, where you can change the VLAN name or ID, and add or remove ports from the VLAN.
Delete	To delete a VLAN, click the VLAN name in the list and click Delete.

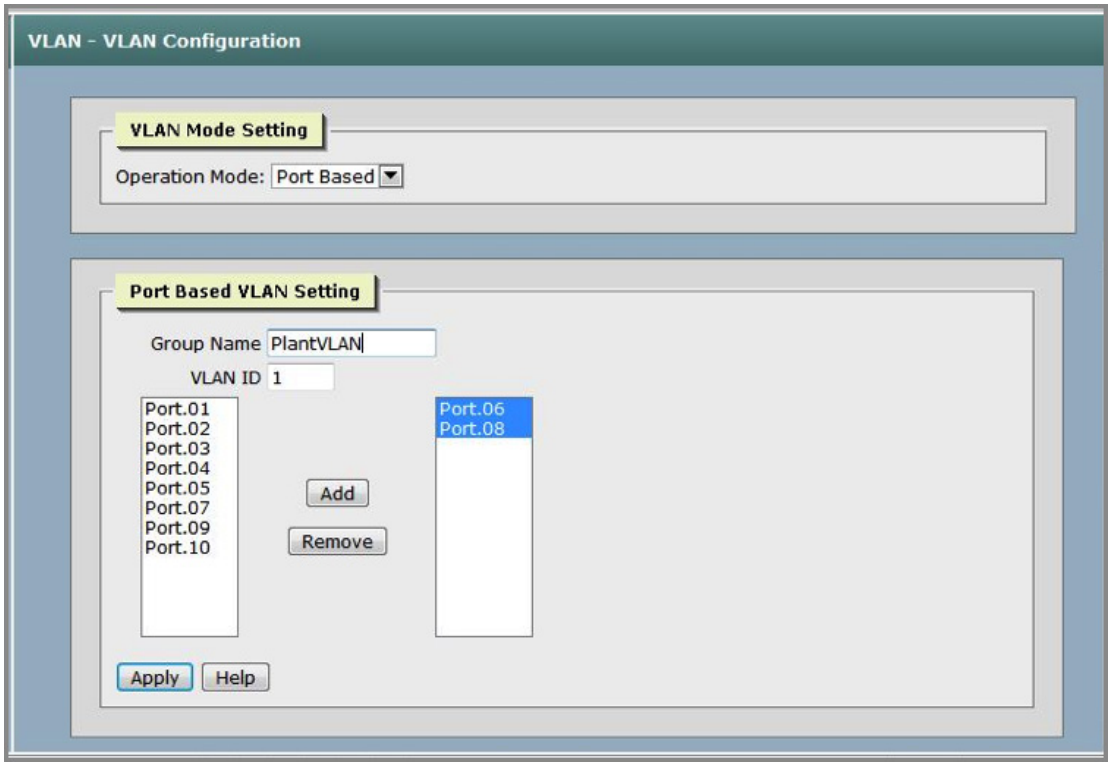


Figure 64 VLAN Configuration - Port-based VLAN (Step 2)

Operation Mode	Select the VLAN operation mode or disable VLAN. The following fields appear when you choose Port Based VLAN mode.
Group Name	Assign a name to the VLAN.
VLAN ID	Assign an identifier to the VLAN.
Add	To add a port to the VLAN, click the port in the left port column and click **Add**. The port appears in the right column, indicating that it is in the VLAN.
Remove	To remove a port from the VLAN, click the port in the left column and click **Remove**.
Apply	Click to apply the settings.

VLAN Switch Status

Use the Switch Status page to see the status of VLAN settings. To display this page, choose **Configure**-->**VLAN**-->**Switch Status**.

Figure 65 VLAN Switch Status

6.5.10 QoS

Quality of Service (QoS) allows you to assign a priority to various applications, users, or data flows, or guarantee a specific level of performance to a data flow. QoS guarantees are important if network capacity is insufficient, particularly for real-time streaming multimedia applications, such as voice-over-P and video teleconferencing. These applications often require a fixed bit rate. They are also delay sensitive and are in networks where capacity is a limited resource—for example, cellular data communication. In the absence of network congestion, QoS mechanisms are not required.

QoS Global Settings

To configure QoS policy, choose **Configure**-->**QoS**-->**Global Settings**. You can choose an 8-4-2-1 queuing scheme, a strict priority scheme, or select a priority type.

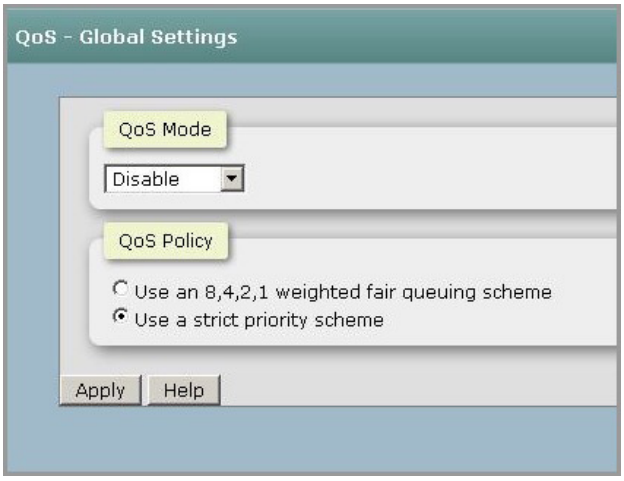


Figure 66 QoS Global Settings

QoS Mode — Select from the following modes, or select "Disable" to turn off QoS.

- Port Based—The output priority is determined by the ingress port.
- COS Only—The output priority is determined by COS (Class of Service) only.
- TOS Only—The output priority is determined by TOS (Type of Service) only.
- COS First—The output priority is determined by COS and TOS, but COS first.
- TOS First— The output priority is determined by COS and TOS, but TOS first.

QoS Policy — Select the QoS policy rule:

Using the 8,4,2,1 weight fair queue scheme—The switch will follow 8:4:2:1 rate to process priority queue from the highest to the lowest queue. For example, 8 high queue packets, 4 middle queue packets, 2 low queue packets, and 1 lowest queue packet are all transmitted at the same time, in accordance with the 8,4,2,1 policy rule.

Use a strict priority scheme—The switch will always process packets in the higher queue first, until the higher queue is empty.

Apply — Click to apply the settings.

Port Priority

When the QoS Mode on the QoS - Global Settings page is set to “Port Based,” you can set the queuing policy for each port.

To display the QoS Port Priority page, choose **Configure**-->**QoS**-->**Port Priority**.

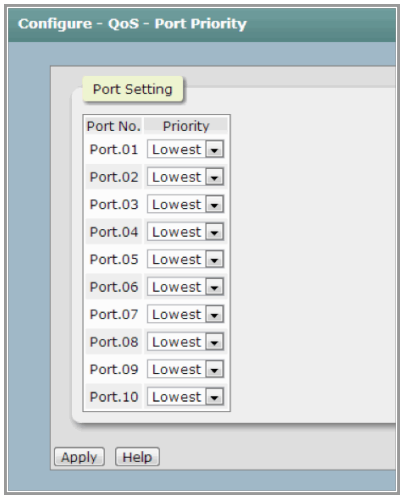


Figure 67 Port Priority

Priority	Select a priority level (high, middle, low, or lowest).
Apply	Click to apply the settings.

COS Mapping to Queue

When QoS Mode field on the QoS Global Settings page is set to “COS Only” or “COS First,” you can set the COS queuing policy for each port.

To set up COS mapping to queue, choose **Configure**-->**QoS**-->**CoS Mapping to Queue**.

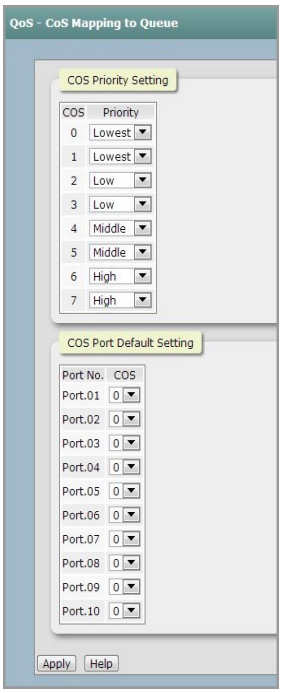


Figure 68 COS Mapping to Queue

COS Priority	Select a COS priority level (high, middle, low, or lowest).
COS Port Default	Assign a default priority value to each port. A default priority is considered and determined by the ingress port when an ingress packet has no VLAN tag.
Apply	Click to apply the setting.

DSCP Mapping to Queue

This page allows you to set the default priority for incoming packets that do not have a priority assigned to them. To configure DSCP mapping to queue, choose **Configure**-->**QoS**-->**DSCP Mapping to Queue**.

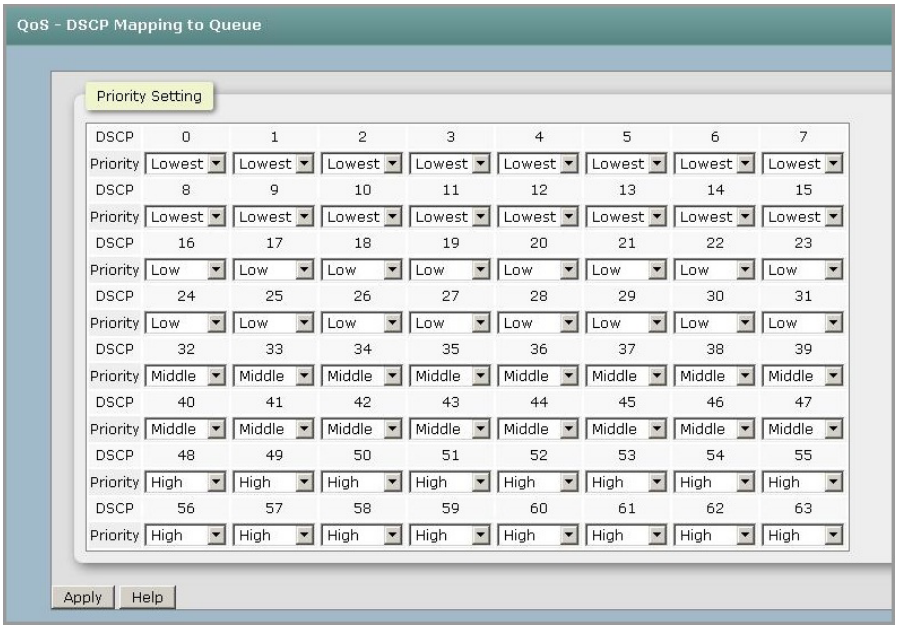

QoS - DSCP Mapping to Queue
Priority Setting
DSCP 0 1 2 3 4 5 6 7
Priority Lowest Lowest Lowest Lowest Lowest Lowest Lowest Lowest
DSCP 8 9 10 11 12 13 14 15
Priority Lowest Lowest Lowest Lowest Lowest Lowest Lowest Lowest
DSCP 16 17 18 19 20 21 22 23
Priority Low Low Low Low Low Low Low Low
DSCP 24 25 26 27 28 29 30 31
Priority Low Low Low Low Low Low Low Low
DSCP 32 33 34 35 36 37 38 39
Priority Middle Middle Middle Middle Middle Middle Middle Middle
DSCP 40 41 42 43 44 45 46 47
Priority Middle Middle Middle Middle Middle Middle Middle Middle
DSCP 48 49 50 51 52 53 54 55
Priority High High High High High High High High
DSCP 56 57 58 59 60 61 62 63
Priority High High High High High High High High
Apply
Help

Figure 69 DSCP Mapping to Queue

DSCP priority — The system provides 0–63 DSCP priority levels. Each level has four priority types: High, Middle, Low, and Lowest. The default value is “Lowest” priority for each level. When an IP packet is received, the system will check the DSCP level value in the packet and grant it the appropriate priority. For example, if you set DSCP level 25 as “High,” and system finds that the DSCP value of the received IP packet is 25, the packet will receive highest priority.

Apply — Click to apply the settings.

6.5.11 Port Mirroring

Port mirroring is a method for monitoring traffic in switched networks. Traffic through ports can be monitored by one specified port, which means traffic going in or out of monitored (source) ports will be duplicated into mirror (destination) ports.

To set up port mirroring, choose **Configure**-->**Mirroring**.

NOTE All the duplicated data of the source port can be separated with RX and TX. If you want to collect multi-source ports at the same time, you can assign the TX of one destination port to be responsible for collecting all the TX data of source ports and assign another RX of destination port to be responsible for collecting all the RX data of source ports.

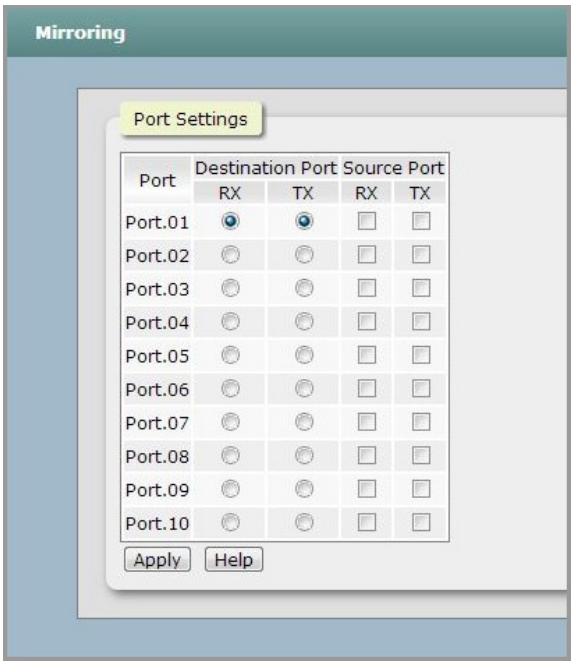


Figure 70 Mirroring

Destination Port	Set which switch port will be responsible for collecting the data that was duplicated from the source port.
Source Port	Set which switch port will have its data duplicated and sent to the destination port.
Apply	Click to apply the settings.

6.6 Security Menu

The Security function allows you to block unauthorized clients.

6.6.1 IP Source Guard Configuration

IP Source Guard allows you to limit the number of personnel authorized to manage the switch through HTTP and Telnet services by restricting access to ten IP addresses.

To configure this function, choose **Security**-->**IP Source Guard**-->**Configuration**.

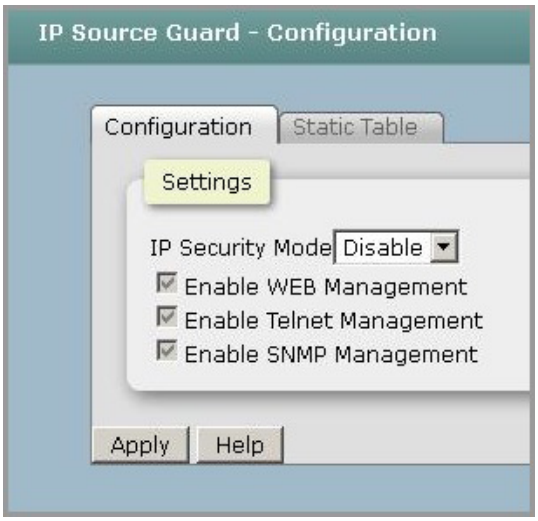


Figure 71 IP Source Guard - Configuration

IP Security Mode	Enable or disable IP security. When security is enabled, the fields on this page become active.
Enable Web Management	When this checkbox is selected, any device whose IP address matches one of the 10 IP addresses in the Security IP1–P10 table (see the next section) will be given permission to access this switch via HTTP service.
Enable Telnet Management	When this checkbox is selected, any device whose IP address matches one of the 10 IP addresses in the Security IP1–IP10 table (see the next section) will be given permission to access this switch via Telnet service.
Enable SNMP Management	When this checkbox is selected, any device whose IP address matches one of the 10 IP addresses in the Security IP1–IP10 table (see the next section) will be given permission to access this switch via SNMP service.
Apply	Click to apply the settings.

Static Table

The system allows you to assign up to ten IP addresses for access security. When IP Security Mode is enabled on the IP Source Guard Configuration page, only these ten IP addresses will be able to access and manage the switch through the HTTP/Telnet/SNMP service.

To set up the IP address table, click the **Static Table** tab on the IP Source Guard Configuration page. (To display this page, choose **Security**-->**IP Source Guard**-->**Configuration**.)

NOTE Remember to choose Maintenance-->Save Configuration, and then click "Save" to save the new configuration. Otherwise, the new configuration will be lost when the switch powers off. See "6.7.1 Save Configuration."

Figure 72 IP Source Guard - Static Table

Security IP 1–10	Enter the IP addresses that will be allowed to access and manage the switch through the HTTP/Telnet service.
Apply	Click to apply the settings.

6.6.2 802.1X/Radius

The IEEE authentication specification 802.1X prevents the client from accessing a wireless access point or wired switch until it provides security information, such as a user name and password, which is verified by an authentication server (for example, a RADIUS server).

802.1X/Radius Configuration

Use the 802.1x/Radius - Configuration page to configure a RADIUS server. To display this page, choose **Security-->802.1x/Radius-->Configuration**.

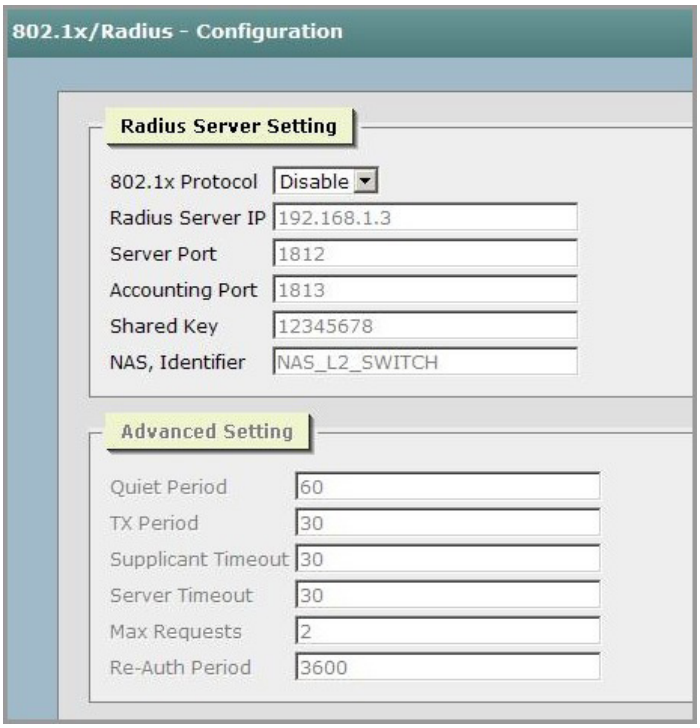


Figure 73 802.1X Radius - Configuration

IEEE 802.1x Protocol	Enable or disable 802.1x protocol. When enabled, the configuration parameters become available.
Radius Server IP	Assign the RADIUS server IP address.
Server Port	Set the UDP destination port for authentication requests to the specified RADIUS server.
Accounting Port	Set the UDP destination port for accounting requests to the specified RADIUS server.
Shared Key	Set an encryption key for use during authentication sessions with the specified RADIUS server. This key must match the encryption key used on the RADIUS server.
NAS, Identifier	Set the identifier for the RADIUS client.
Quiet Period	Set the number of seconds during which the port will not attempt to acquire a supplicant.
TX Period	Set the number of seconds that the port waits before retransmitting the next EAPOL PDU during an authentication session.
Supplicant Timeout	Set the number of seconds that the switch waits for a supplicant response to an EAP request.

Server Timeout	Set the number of seconds that the switch waits for a server response to an authentication request.
Max Requests	Set the number of authentications that must time-out before authentication fails and the authentication session ends.
Re-Auth period	Set the number of seconds after which connected clients must be re-authenticated.
Apply	Click to apply the settings.

802.1X/Radius Port Setting

You can configure the 802.1x authentication state for each port. To configure the port settings, choose **Security**-->**802.1x/Radius**-->**Port Settings**.

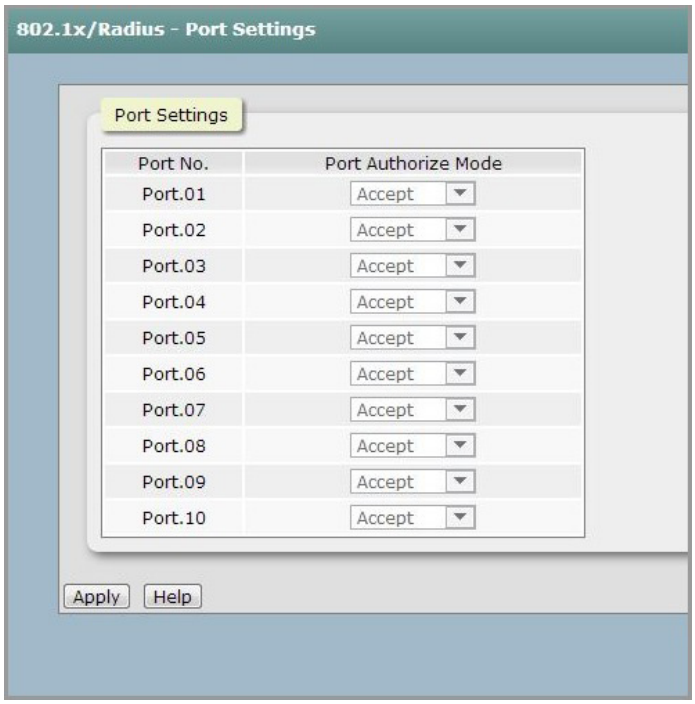


Figure 74 802.1X Radius - Port Setting

Port Authorization Mode	You can choose from the following authorization states: • **Reject**—The specified port is required to be held in the unauthorized state. • **Accept**—The specified port is required to be held in the authorized state. • **Authorize**—The specified port is set to the Authorized or Unauthorized state in accordance with the outcome of an authentication exchange between the supplicant and the authentication server. • **Disable**—When disabled, the specified port works without complying with 802.1x protocol.
Apply	Click to apply the settings.

802.1X/Radius Port Status

To display the authorization status of a port, choose **Security**-->**802.1x/Radius**-->**Port Status** (see Figure 75).

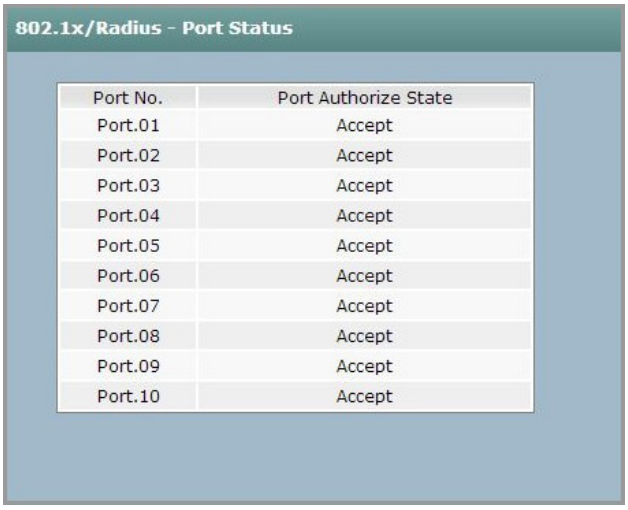


Figure 75 802.1X Radius - Port Status

6.6.3 MAC Filtering

To block an unauthorized MAC address by switch, choose **Security**-->**MAC Filtering**. The MAC blacklist shows the list of MAC addresses that are currently blocked.

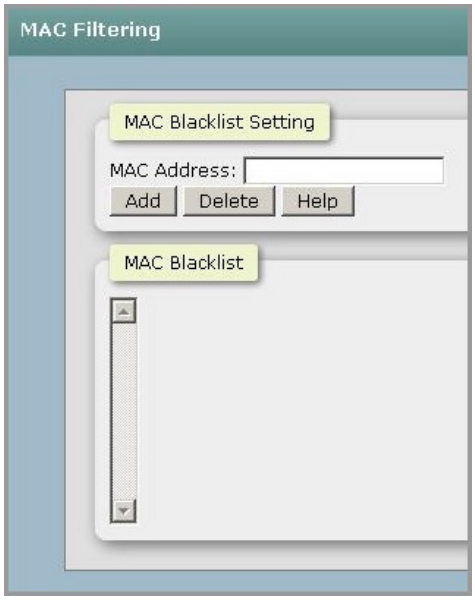


Figure 76 MAC Filtering

MAC Address Enter a MAC address that you want add or delete from the MAC blacklist. Addresses on the blacklist will be blocked by the switch.

Add, Delete Click Add to add the address to the MAC blacklist, or click Delete to remove the address from the MAC blacklist.

6.6.4 Port Security

To block (or unblock) a MAC address by port, choose **Security**-->Port **Security**.

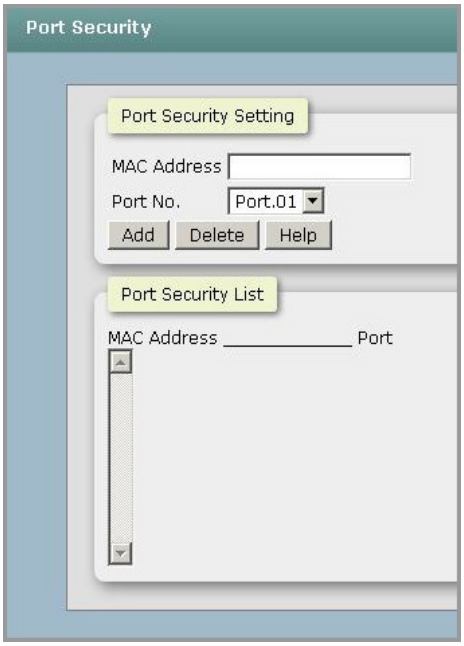


Figure 77 Port Security

MAC Address	Enter a MAC address that you want add or delete from the Port Security List. Addresses on this list will be allowed access to the port..
Port No.	Select a port number.
Add, Delete	Click Add to add the address to the Port Security List, or click Delete to remove the address from the Port Security List.

6.7 Maintenance

6.7.1 Save Configuration

The Save Configuration page allows you to save the current switch settings. To display this page, choose **Maintenance**-->**Save Configuration**.

Figure 78 Save Configuration

6.7.2 Restart Device

To reboot the switch, choose **Maintenance**-->**Restart Device**, and then click **Reboot**.

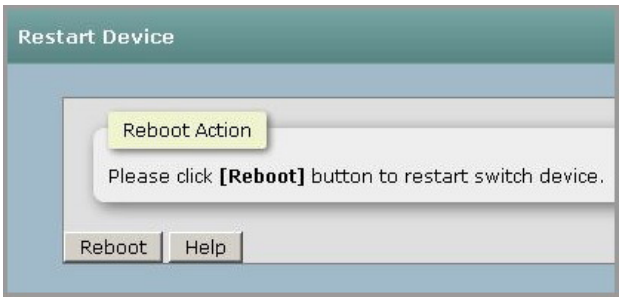


Figure 79 Restart Device

6.7.3 Factory Defaults

To reset the switch to its default configuration, choose **Maintenance**-->**Factory Defaults**, and then click Reset. You have the option of keeping the current IP address, username, and password settings.

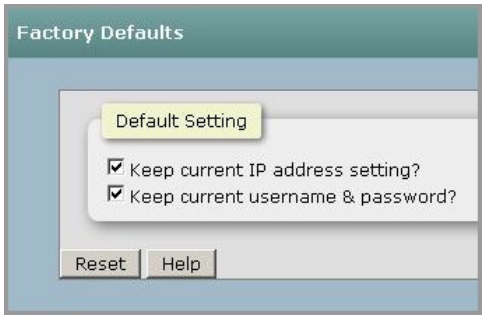


Figure 80 Factory Defaults

6.7.4 Firmware Upgrade

The firmware upgrade software image for the 5073E-T Switch can be obtained by contacting a Sales Representative. To upgrade the firmware from a TFTP server or a website, choose **Maintenance**-->**Firmware Upgrade**. Click the tab for the upgrade method you want to use.

NOTE If you are updating the firmware from a TFTP server, before you begin make sure that the firmware image has been copied to the default directory on the TFTP server.

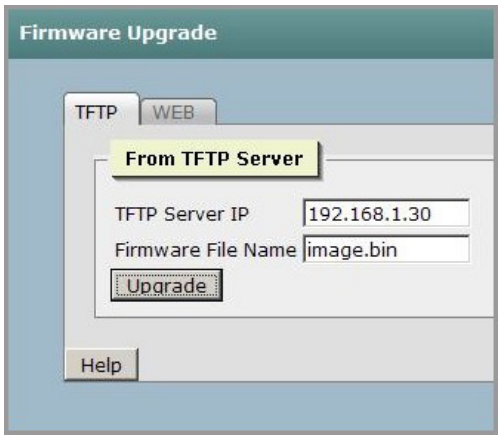


Figure 81 Firmware Upgrade - TFTP

TFTP Server IP Address	Enter your TFTP server IP address.
Firmware File Name	Enter the name of the firmware image file to be updated.
Upgrade	Click to upgrade to the new firmware.

The Web tab allows you to use a browser to update the firmware on your hard drive. This function is not supported by the Google Chrome browser.

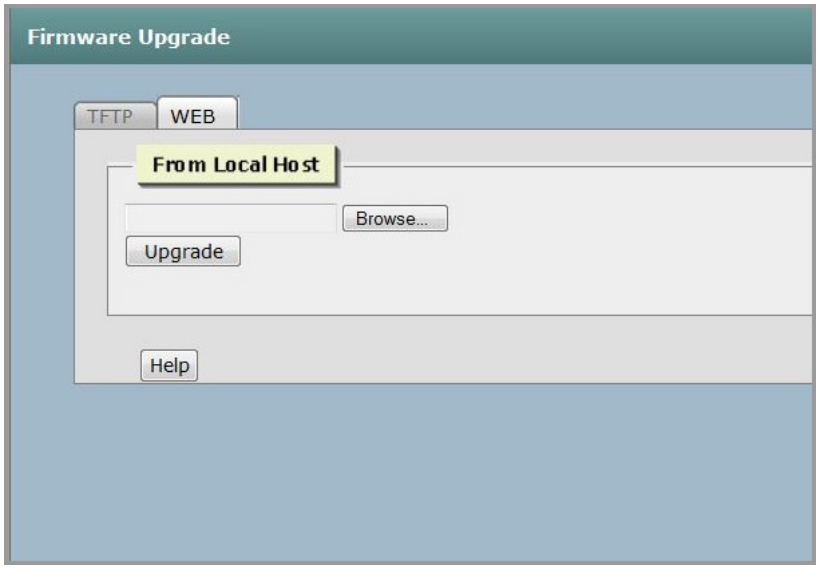


Figure 82 Firmware Upgrade - Web

Browse	Click to locate the new firmware image file.
Upgrade	Click to upgrade to the new firmware.

6.7.5 Export/Import

You can back up (export) the current configuration from flash ROM to the TFTP server or a local computer connected to the 5073E-T Switch (see Figure 83). You can also recover (import) a previous backup configuration to restore the settings (see Figure 84). This saves having to manually reconfigure settings.

To use the export or import function, choose **Maintenance**-->**Export/Import**.

All system parameters except the following are backed up and restored with the import/export operation.

System/General-Asset /Switch Settings:

- System Name
- System Description
- System Location
- System Contact

System/IP Addressing/IPV4 IP Settings:

- DHCP Client
- IP Address
- Subnet Mask
- Gateway
- DNS1
- DNS2

System/Account – Admin Settings:

- User Name
- New Password
- Confirm Password

NOTE The 5073E-T Web server works best when used with Internet Explorer. The Google Chrome browser does not support exporting to or importing from a local computer (a computer connected to the switch).

To export a configuration file to a TFTP server, enter the TFTP server IP address and the backup file name, and then click **Backup** in the upper part of the Export tab.

To export a configuration file to a local computer connected to the 5073E-T Switch, click **Backup** in the bottom part of the Export tab.

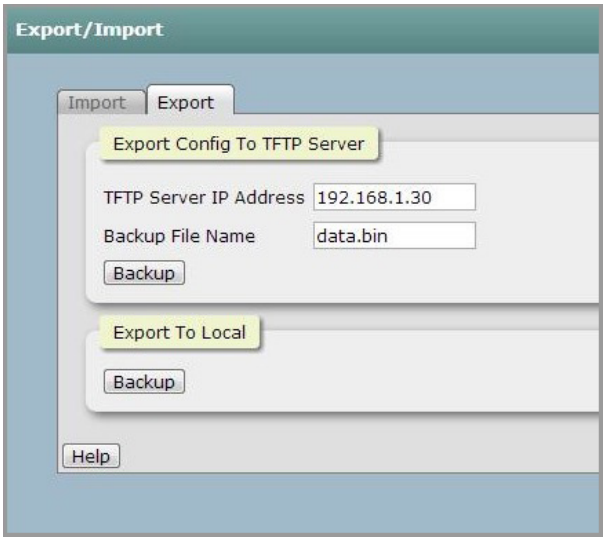


Figure 83 Export

TFTP Server IP Address	Allows you to back up the configuration file to the TFTP server. Enter the TFTP server IP address.
Backup File Name	Enter the file name.
Backup	Click to backup the configuration. To backup to the TFTP server, click Backup in the upper box. To backup to the local computer connected to the 5073E-T Switch, click Backup in the lower box.

To import a configuration file that was exported to a TFTP server, enter the TFTP server IP address and the backup file name, and then click **Restore** in the upper part of the Import tab.

To import a configuration file that was exported to a local computer connected to the 5073E-T Switch, use the **Browse** button to locate the backup file, and then click **Restore** in the bottom part of the Import tab.

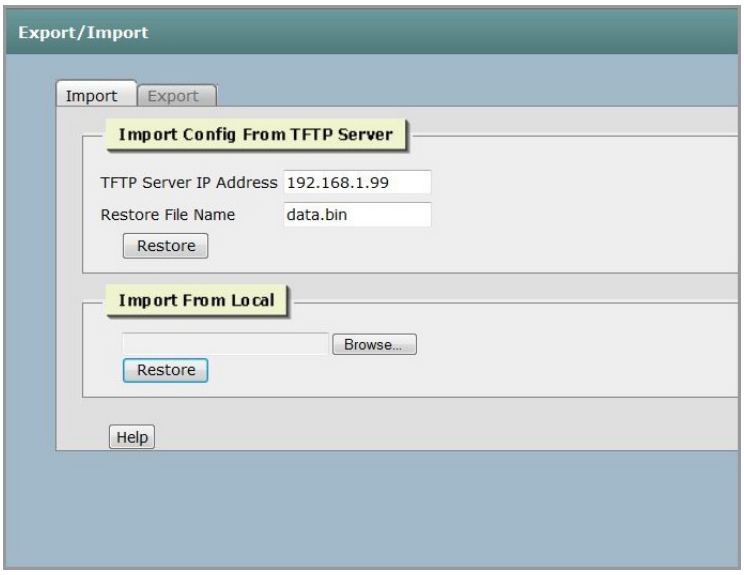


Figure 84 Import

TFTP Server IP Address	Allows you to import a configuration file from a TFTP server. Enter the TFTP server IP address.
Restore File Name	Enter the file name to be restored.
Browse	Allows you to import a configuration file from a local computer connected to the 5073E-T Switch. Click Browse to locate the file.
Restore	Click to restore the backup.

6.7.6 Diagnostics

Ping

To ping other network devices, choose **Maintenance**-->**Diagnostics**-->**Ping**, enter the IP address you want to ping, and then click **Active**.

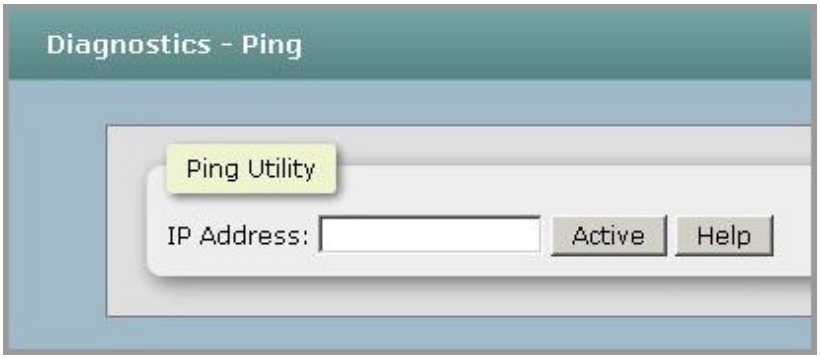


Figure 85 Diagnostics - Ping

DDM

To configure digital diagnostic monitoring (DDM) functions, choose **Maintenance**-->**Diagnostics**-->**DDM**.
DDM enables you to monitor real-time parameters of the SFP ports and set whether the port logs alarm events to the Syslog on the switch.

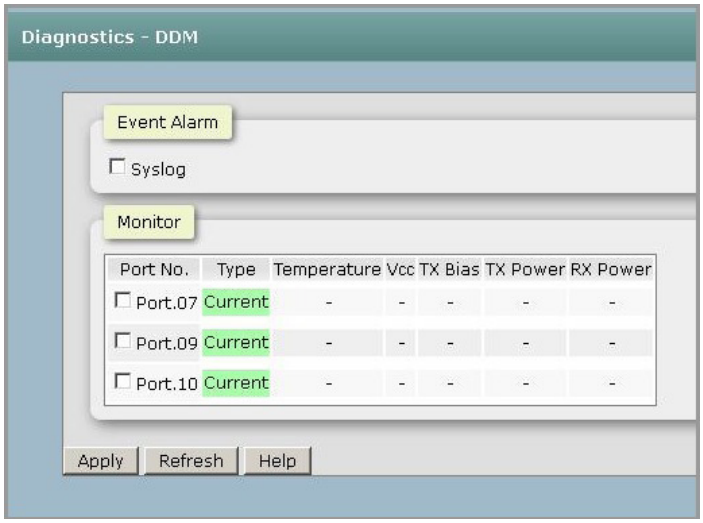


Figure 86 Diagnostics - DDM

Syslog	When selected, the port will log alarm events to the local Syslog on the switch.
Port No.	Select this checkbox to display the SFP module information. This assumes that the SFP module is installed and connected to the switch via a fiber cable.
Type	Alarm and warning type of the SFP default threshold.
Temperature	Internal temperature of the SFP (default threshold and current value).
Vcc	Supply voltage of the SFP (default threshold and current value).
TX Bias	Bias current of the SFP (default threshold and current value).
TX PWR	Transmit power of the SFP (default threshold and current value).
RX PWR	Receive power of the SFP default threshold and current value.
Apply	Click to apply the settings.
Refresh	Click to refresh the page.

6.8 Troubleshooting

Follow these steps to troubleshoot switch problems.

1. Verify that you are using the right power cord or adapter (DC 12–48V).

   WARNING Do not use a power adapter with DC output greater than 48V, or it may damage the device.

2. Verify that you are using the proper UTP/STP cable to construct the user network.

   Use unshielded twisted-pair (UTP) or shield twisted-pair (STP) cable for RJ-45 connections, depending on the connector type on the switch. Use 100Ω Category 3, 4 or 5 cables for 10 Mbps connections, 100Ω Category 5 cable for 100 Mbps connections, or 100Ω Category 5e/above cable for 1000 Mbps connections. In addition, make sure that the length of any twisted-pair connection does not exceed 100 meters (328 ft).

3. Use the LED indicators to help diagnose the problem.

   To assist in identifying problems, the switch can be easily monitored through the panel indicators, which

describe common problems you may encounter and indicate where you can find solutions.

4. If the power indicator does not turn on when the power cord is plugged in, you may have a problem with power cord. Check for loose power connections, power losses, or surges at the power outlet. If you still cannot resolve the problem, contact your local dealer for assistance.
5. If the LED indicators are normal and the connected cables are correct but packets still cannot be transmitted, check the configuration or status of the system's Ethernet devices.

APPENDIX A - RJ-45 PIN ASSIGNMENT

The UTP/STP ports will automatically detect fast Ethernet (10Base-T/100Base-TXconnections), or Gigabit Ethernet (10Base-T/100Base-TX/1000Base-T connections). Auto MDI/MDIX means that the switch can connect to another switch or workstation without changing straight-through or crossover cabling. See the figures in this appendix for straight through and crossover cable schematics.

10 /100BASE-TX Pinouts

With a 10/100BASE-TX cable, pins 1 and 2 are used for transmitting data, and pins 3 and 6 are used for receiving data.

RJ-45 Pin Assignments

Pin Number	Assignment
1	Tx+
2	Tx-
3	Rx+
6	Rx-
NOTE The "+" and "-" signs represent the polarity of the wires that make up each wire pair.	

The following table shows the 10/100BASE-TX MDI and MDI-X port pin outs.

Pin Number	MDI-X Signal Name	MDI Signal Name
1	Receive Data plus (RD+)	Transmit Data plus (TD+)
2	Receive Data minus (RD-)	Transmit Data minus (TD-)
3	Transmit Data plus (TD+)	Receive Data plus (RD+)
6	Transmit Data minus (TD-)	Receive Data minus (RD-)

10/100Base-TX Cable Schematic

Figure 87 and Figure 88 show the 10/100Base-TX cable schematic.

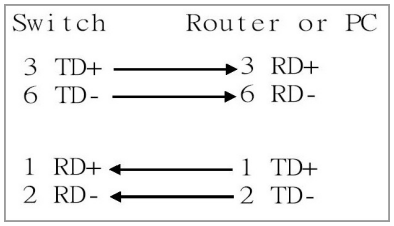


Figure 87 Straight-through Cable Schematic

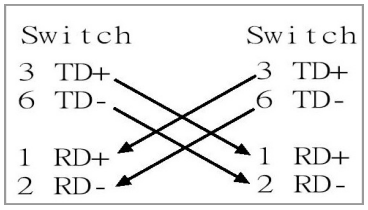


Figure 88 Crossover Cable Schematic

10/100/1000Base-TX Pinouts

Figure 89 shows the 10/100/1000 Ethernet RJ-45 pinouts.

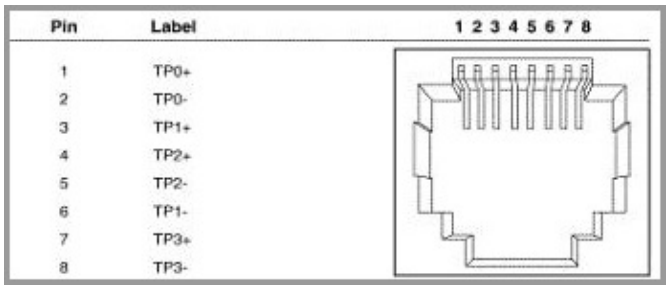


Figure 89 10/100/1000 Ethernet RJ-45 Pinouts

10/100/1000Base-TX Cable Schematic

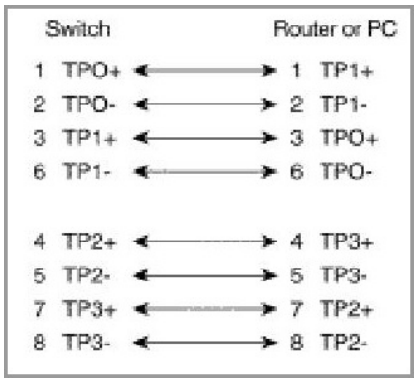


Figure 90 Straight-through Cable Schematic

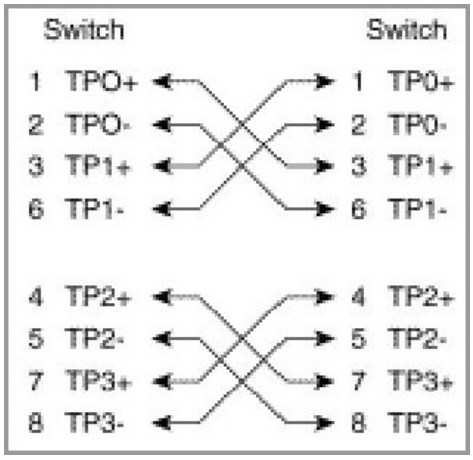


Figure 91 Crossover Cable Schematic

APPENDIX B - COMMAND SETS

This appendix describes the command sets for the 5073E-T Managed Ethernet Switch. The commands are associated with a user level, described in the following key.

E = User EXEC

P = Privileged EXEC

G = Global configuration

V = VLAN database

I = Interface configuration

802.1x Commands

CLI Commands	Level	Description	Example
8021x enable	G	Enable IEEE802.1x function.	switch>enable switch#configure switch(config)# 8021x enable
8021x system radiusip [Radius Server IP]	G	Use the 802.1x system radius IP global configuration command to change the radius server IP address.	switch>enable switch#configure switch(config)# 8021x system radiusip 192.168.1.1
8021x system serverport [Port Number]	G	Use the 802.1x system server port global configuration command to change the radius server port.	switch>enable switch#configure switch(config)# 8021x system serverport 1815
8021x system accountport [Port Number]	G	Use the 802.1x system account port global configuration command to change the accounting port.	switch>enable switch#configure switch(config)# 8021x system accountport1816
8021x system sharedkey [SharedKey]	G	Use the 802.1x system share key global configuration command to change the shared key value.	switch>enable switch#configure switch(config)# 8021x system sharedkey123456
8021x system nasid [NAS ID]	G	Use the 802.1x system nasid global configuration command to change the NAS ID.	switch>enable switch#configure switch(config)# 8021x system nasid test1
8021x misc quietperiod [Seconds]	G	Use the 802.1x misc quiet period global configuration command to specify the quiet period value of the switch.	switch>enable switch#configure switch(config)# 8021x misc quietperiod 10
8021x misc txperiod [Seconds]	G	Use the 802.1x misc TX period global configuration command to set the TX period.	switch>enable switch#configure switch(config)# 8021x misc txperiod 5
8021x misc supptimeout [Seconds]	G	Use the 802.1x misc supp timeout global configuration command to set the supplicant timeout.	switch>enable switch#configure switch(config)# 8021x misc supptimeout 20

CLI Commands	Level	Description	Example
8021x misc servertimeout [Seconds]	G	Use the 802.1x misc server timeout global configuration command to set the server timeout.	switch>enable switch#configure switch(config)#8021x misc servertimeout 20
8021x misc maxrequest [number]	G	Use the 802.1x misc max request global configuration command to set the MAX requests.	switch>enable switch#configure switch(config)# 8021x misc maxrequest 3
8021x misc reauthperiod [Seconds]	G	Use the 802.1x misc reauth period global configuration command to set the reauthorization period.	switch>enable switch#configure switch(config)# 8021x misc reauthperiod 3000
8021x portstate [disable | reject | accept | authorize]	I	Use the 802.1xport state interface configuration command to set the state of the selected port.	switch>enable switch#configure switch(config)#interface fastethernet 3 switch(config-if)#8021x portstate authorize
show 8021x	P	Displays a summary of the 802.1xproperties and also the port sates.	switch>enable switch#show 8021x
no 8021x	G	Disable 802.1x function.	switch>enable switch#configure switch(config)#no 8021x

Admin Password Commands

CLI Commands	Level	Description	Example
admin username [Username]	G	Change a login username (maximum 10 characters).	switch>enable switch#configure switch(config)#admin username xxxxxx
admin password [Password]	G	Specify a password (maximum 10 characters).	switch>enable switch#configure switch(config)#admin password xxxxxx
show admin	P	Show administrator information.	switch>enable switch#show admin

Backup and Restore Commands

CLI Commands	Level	Description	Defaults/Example
tftp [server IP] **backup** [file name]	G	Save configuration to TFTP. Need to specify the IP address of TFTP server and the file name of image.	switch>enable switch#configure switch(config)#tftp 192.168.1.120 backup 123.bin

CLI Commands	Level	Description	Defaults/Example
tftp [server IP] **restore** [file name]	G	Get configuration from TFTP server. Need to specify the IP address of the TFTP server and the file name of image.	switch>enable switch#configure switch(config)#tftp 192.168.1.120 restore 123.bin

CLI Commands

CLI Commands	Level	Description	Example
enable	E	Enter Privileged EXEC mode.	switch>enable
quit	E	Logout command line shell.	switch>quit
show	E	Show switch configuration.	switch>show config
uptime	E	Show system up time.	switch>uptime
disable	P	Leave Privileged EXEC mode.	switch>enable switch#disable
configure	P	Enter Global Configuration mode.	switch>enable switch#configure
end	G	Leave Global Configuration mode.	switch>enable switch#>configure switch(config)#end switch#>
exit	G	Leave Global Configuration mode.	switch>enable switch#>configure switch(config)#exit switch#>

DHCP Server Commands

CLI Commands	Level	Description	Example
dhcpserver enable	G	Enable DHCP server.	switch>enable switch#configure switch(config)#dhcpserver enable
dhcpserver lowip [Low IP]	G	Configure low IP address for IP address pool.	switch>enable switch#configure switch(config)#dhcpserver lowip 192.168.1.100
dhcpserver highip [High IP]	G	Configure high IP address for IP address pool.	switch>enable switch#configure switch(config)#dhcpserver highip 192.168.1.200
dhcpserver subnetmask [Subnet mask]	G	Configure subnet mask for DHCP clients.	switch>enable switch#configure switch(config)#dhcpserver subnetmask 255.255.255.0

CLI Commands	Level	Description	Example
dhcpserver gateway [Gateway]	G	Configure gateway for DHCP clients.	switch>enable switch#configure switch(config)#dhcpserver gateway 192.168.1.254
dhcpserver dnsip [DNS IP]	G	Configure DNS IP address for DHCP clients.	switch>enable switch#configure switch(config)#dhcpserver dnsip 192.168.1.1
dhcpserver leasetime [Hours.]	G	Configure lease time (hours.)	switch>enable switch#configure switch(config)#dhcpserver leasetime 1
dhcpserver ipbinding [IP address]	I	Set static IP address for DHCP clients by port.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#dhcpserver ipbinding 192.168.1.1
show dhcpserver configuration	P	Show configuration of DHCP server.	switch>enable switch#show dhcpserver configuration
show dhcpserver clients	P	Show client entries of DHCP server.	switch>enable switch#show dhcpserver clients
show dhcpserver ip-binding	P	Show IP-Binding information of DHCP server.	switch>enable switch#show dhcpserver ip-binding
no dhcpserver	G	Disable DHCP server function.	switch>enable switch#configure switch(config)#no dhcpserver

Factory Default Command

CLI Commands	Level	Description	Example
default [keepip|keepadmin|both]	G	Restore to factory default configuration.	switch>enable switch#configure switch(config)#default both

Fault Alarm Commands

CLI Commands	Level	Description	Example
fault-relay power [number] [enable/disable]	G	Configure relay alarm for power failure.	switch>enable switch#configure switch(config)#fault-relay power 1 enable
fault-relay [enable/disable]	I	Configure relay alarm for port link down/broken.	switch>enable switch#configure switch(config)#interface fastEthernet 1 switch(config-if)#fault-relay enable
show fault-relay	P	Show fault relay alarm setting.	switch>enable switch#show fault-relay

CLI Commands	Level	Description	Example
no fault-relay	G	Disable fault relay alarm function.	switch>enable switch#configure switch(config)#no fault-relay

IGMP Commands

CLI Commands	Level	Description	Example
igmp enable	G	Enable IGMP snooping function.	switch>enable switch#configure switch(config)#igmp enable
igmp query [auto/fource]	G	Configure IGMP query mode.	switch>enable switch#configure switch(config)#igmp query auto
igmp unregister [flooding/blocking/ sourceonly]	G	Configure IGMP unregister stream.	switch>enable switch#configure switch(config)#igmp unregister flooding
igmp last-query-count [1–2 sec.]	G	Configure last member query count.	switch>enable switch#configure switch(config)# igmp last-query-count 1
igmp last-query-interval [1–250 tenths of a sec.]	G	Configure last member query interval.	switch>enable switch#configure switch(config)#igmp last-query-interval 100
igmp query-interval [1–250 sec.]	G	Configure query interval.	switch>enable switch#configure switch(config)#igmp query-interval 100
igmp query-response-interval [1–250 tenths of a sec.]	G	Configure query response interval.	switch>enable switch#configure switch(config)#igmp query-response-interval100
show igmp configuration	P	Show IGMP configuration.	switch>enable switch#show igmp configuration
show igmp table	P	Show IGMP snooping table.	switch>enable switch#show igmp table
no igmp	G	Disable IGMP snooping function.	switch>enable switch#configure switch(config)#no igmp
no igmp query	G	Disable IGMP query.	switch>enable switch#configure switch(config)#no igmp query

IP Security Commands

CLI Commands	Level	Description	Example
security enable	G	Enable IP security function.	switch>enable switch#configure switch(config)#security enable
security http	G	Enable IP security of HTTP server.	switch>enable switch#configure switch(config)#security http
security telnet	G	Enable IP security of telnet server.	switch>enable switch#configure switch(config)#security telnet
security snmp	G	Enable IP security of SNMP server.	switch>enable switch#configure switch(config)#security snmp
security ip [Index(1..10)] [IP Address]	G	Set the IP security list.	switch>enable switch#configure switch(config)#security ip 1 192.168.1.55
show security	P	Show the information of IP security.	switch>enable switch#show security
no security	G	Disable IP security function.	switch>enable switch#configure switch(config)#no security
no security http	G	Disable IP security of HTTP server.	switch>enable switch#configure switch(config)#no security http
no security telnet	G	Disable IP security of Telnet server.	switch>enable switch#configure switch(config)#no security telnet
no security snmp	G	Disable IP security of SNMP server.	switch>enable switch#configure switch(config)#no security snmp

IP Setting Commands

CLI Commands	Level	Description	Example
ip address [Ip-address] [Subnet-mask] [Gateway]	G	Configure the IP address of switch.	switch>enable switch#configure switch(config)#ip address 192.168.1.1 255.255.255.0 192.168.1.254
ip dhcp	G	Enable DHCP client function of switch.	switch>enable switch#configure switch(config)#ip dhcp
show ip	P	Show IP information of switch.	switch>enable switch#show ip

CLI Commands	Level	Description	Example
no ip dhcp	G	Disable DHCP client function of switch.	switch>enable switch#configure switch(config)#no ip dhcp

LLDP Commands

CLI Commands	Level	Description	Example
lldp enable	G	Enable LLDP function.	switch>enable switch#configure switch(config)#lldp enable
lldp interval [TIME sec]	G	Configure LLDP interval.	switch>enable switch#configure switch(config)#lldp interval 1800
lldp synctime [enable|disable]	G	Enable or disable LLDP sync time.	switch>enable switch#configure switch(config)#lldp synctime enable
show lldp	P	Show LLDP information.	switch>enable switch#show lldp
no lldp	G	Disable LLDP.	switch>enable switch#configure switch(config)#no lldp

Loading Average Commands

CLI Commands	Level	Description	Example
loadavg	E	Show system load average.	switch>loadavg
event loadavg syslog	G	Set system load average event type.	switch>enable switch#configure switch(config)#event loadavg syslog

Logout Command

CLI Commands	Level	Description	Example
logout	E	Logout command line shell.	switch>logout

MAC Address Table Commands

CLI Commands	Level	Description	Example
show mac-address-table	I	Show MAC address table.	switch>enable switch#configure switch(config)#interface fastethernet 2 switch(config-if)#show mac-address-table
show mac-address-table all	P	Show MAC address table (all).	switch>enable switch#show mac-address-table all

CLI Commands	Level	Description	Example
no mac-address-table	G	Remove dynamic entry of MAC address table.	switch>enable switch#configure switch(config)#no mac-address-table
agingtime [seconds 0–3825 steps 15]	G	Configure MAC address table aging time.	switch>enable switch#configure switch(config)#agingtime 30
auto-flush [enable|disable]	G	Auto flush MAC address table when ports link is down.	switch>enable switch#configure switch(config)#auto-flush enable

MAC Blacklist Commands

CLI Commands	Level	Description	Example
mac-address-table filter hwaddr [HW-Addr]	G	Configure a MAC address entry of the interface (filter).	switch>enable switch#configure switch(config)#mac-address-table filter hwaddr 000012348678
show mac-address-table filter	P	Show the MAC address table (filter).	switch>enable switch#show mac-address-table filter
no mac-address-table filter hwaddr [HW-Addr]	G	Remove a MAC address entry from the table (filter).	switch>enable switch#configure switch(config)#no mac-address-table filter hwaddr 000012348678

Multicast Static Filtering Table Commands

CLI Commands	Level	Description	Example
multicast-filtering [IP_addr]	I	Configure the multicast filtering entry of the interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config)#multicast-filtering 225.100.100.100
no multicast-filtering [IP_addr]	I	Remove multicast filtering entry of interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#no multicast-filtering 225.100.100.100
show multicast-filtering	P	Show multicast filtering table.	switch>enable switch#show multicast-filtering

Ping Command

CLI Commands	Level	Description	Example
ping [ip]	E	Ping function.	switch>ping 192.168.1.1

Port Control Commands

CLI Commands	Level	Description	Example
interface fastEthernet [Portid]	G	Choose the port for modification.	switch>enable switch#configure switch(config)#interface fastEthernet 2
state [enable|disable]	I	Use the state interface configuration command to specify the state mode of operation for Ethernet ports. Use the disable form of this command to disable the port.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#state disable
duplex [full | half]	I	Use the duplex configuration command to specify the duplex mode of operation for fast Ethernet.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#duplex full
speed [10|100|1000|auto]	I	Use the speed configuration command to specify the speed mode of operation for fast Ethernet. The speed cannot be set to 1000 unless the port is a giga port.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#speed 100
flowcontrol mode [symmetric|asymmetric]	I	Configure flow control.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#flowcontrol mode asymmetric
no flowcontrol	I	Disable flow control of interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#no flowcontrol
security enable	I	Enable security.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#security enable
no security	I	Disable security.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#no security
auto-sfp [Enable|Disable]	G	Enable or disable auto detect 100/1000 SFP.	switch>enable switch#configure switch(config)#auto-sfp disable

CLI Commands	Level	Description	Example
alias [name]	I	Set port alias name.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#alias 1111
show interface configuration	I	Show interface configuration status.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#show interface configuration

Port Monitoring Commands

CLI Commands	Level	Description	Example
monitor destination [RX|TX|Both]	I	Configure destination port of monitor.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#monitor destination rx
monitor source [RX|TX|Both]	I	Configure source port of monitor.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#monitor source rx
show monitor	P	Show port monitor information.	switch>enable switch#show monitor
show monitor	I	Show port monitor information.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#show monitor
no monitor	I	Disable source port of monitor.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#no monitor

Port Security Commands

CLI Commands	Level	Description	Example
mac-address-table static hwaddr [HW-Addr]	I	Configure the MAC address entry of the interface (static).	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#mac-address-table static hwaddr 000012345678
show mac-address-table static	P	Show MAC address table (static).	switch>enable switch#show mac-address-table static

CLI Commands	Level	Description	Example
no mac-address-table static hwaddr [HW-Addr]	I	Remove an entry from the MAC address table of interface (static).	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#no mac-address-table static hwaddr 000012345678

Port Statistics Commands

CLI Commands	Level	Description	Example
show interface accounting	I	Show interface statistic counter.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch switch (config-if)#show interface accounting
no accounting	I	Clear interface accounting information.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#no accounting

Port Status Command

CLI Commands	Level	Description	Example
show interface status	I	Show interface actual status.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch switch (config-if)#show interface status

Pro-Ring2se Commands

CLI Commands	Level	Description	Example
pro-ring2se enable	G	Enable Pro-Ring2se.	switch>enable switch#configure switch(config)# pro-ring2se enable
pro-ring2se mode [master|transit]	G	Configure mode.	switch>enable switch#configure switch(config)# pro-ring2se mode master
pro-ring2se primary-port [Port number]	G	Configure primary port.	switch>enable switch#configure switch(config)# pro-ring2se primary-port 9
pro-ring2se secondary-port [Port number]	G	Configure secondary port.	switch>enable switch#configure switch(config)# pro-ring2se secondary-port 10

CLI Commands	Level	Description	Example
pro-ring2se control-vlan [Vlan ID]	G	Configure control VLAN.	switch>enable switch#configure switch(config)# pro-ring2se control-vlan 100
pro-ring2se protect-vlan [Vlan list]	G	Configure protect VLAN.	switch>enable switch#configure switch(config)# pro-ring2se protect-vlan 200
show pro-ring2se	P	Show Pro-Ring2se configuration.	switch>enable switch# show pro-ring2se
no pro-ring2se	G	DisablePro-Ring2se.	switch>enable switch#configure switch(config)# no pro-ring2se

Rate Limit Commands

CLI Commands	Level	Description	Example
ratelimit type all	I	Set interface ingress limit frame type to “accept all frame.”	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#ratelimit type all
ratelimit type broadcast-multicast-flooded-unicast	I	Set interface ingress limit frame type to “accept broadcast, multicast, and flooded unicast frame.”	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#ratelimit type broadcast-multicast-flooded-unicast
ratelimit type broadcast-multicast	I	Set interface ingress limit frame type to “accept broadcast and multicast frame.”	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#ratelimit type broadcast-multicast
ratelimit type broadcast-only	I	Set interface ingress limit frame type to “only accept broadcast frame.”	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#ratelimit type broadcast-only
ratelimit in [kbps]	I	Set interface input bandwidth. Zero means no limit.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#ratelimit in 160
ratelimit out [kbps]	I	Set interface output bandwidth. Rate range is from 100 kbps to 102400 kbps or to 256000 kbps for giga ports. Zero means no limit.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#ratelimit out 160
show ratelimit	I	Show interfaces bandwidth control.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#show ratelimit

RSTP Commands

CLI Commands	Level	Description	Example
rstp enable	G	Enable RSTP.	switch>enable switch#configure switch(config)#rstp enable
rstp priority [0–61440]	G	Configure RSTP bridge priority parameter.	switch>enable switch#configure switch(config)#rstp priority 4096
rstp max-age [6–40]	G	Configure RSTP max age parameter.	switch>enable switch#configure switch(config)#rstp max-age 6
rstp hello-time [1–10]	G	Configure RSTP hello time parameter.	switch>enable switch#configure switch(config)#rstp hello-time 1
rstp forward-time [4–30]	G	Configure RSTP forward time parameter.	switch>enable switch#configure switch(config)#rstp forward-time 4
rstp path-cost [0:auto,1-200000000]	I	Path cost on this interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#rstp path-cost 20
rstp port-priority [0-240]	I	Port priority on this interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#rstp port-priority 16
rstp admin-p2p [Auto|True|False]	I	Admin P2P on this interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#rstp admin-p2p false
rstp admin-edge [True|False]	I	Admin Edge on this interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#rstp admin-edge false
rstp admin-non-stp [True|False]	I	Admin NonSTP on this interface.	switch>enable switch#configure switch(config)#interface fastEthernet 2 switch(config-if)#rstp admin-non-stp false
show rstp	G	Show RSTP information.	switch>enable switch#show rstp
no rstp	G	Disable RSTP.	switch>enable switch#configure switch(config)#no rstp

Save Configuration Command

CLI Commands	Level	Description	Example
write memory	P	Save user configuration into permanent memory (flash ROM).	switch>enable switch#write memory

SFP Monitor Command

CLI Commands	Level	Description	Example
show ddm	P	Show temperature alarm information.	switch>enable switch# show ddm

SNMP Commands

CLI Commands	Level	Description	Example
snmp agent-mode [v1v2c|v3]	G	Select the agent mode of SNMP.	switch>enable switch#configure switch(config)#snmp agent-mode v1v2c
snmp community-strings [Community] **right** [RO/RW]	G	Add SNMP community string.	switch>enable switch#configure switch(config)#snmp community-strings public right ro
snmp trap server [IP address] **community** [Community-string] **trap-version** [v1|v2c]	G	Configure SNMP server host information and community string.	switch>enable switch#configure switch(config)#snmp trap server 192.168.1.120 community public trap-version v2c
snmp v3-user [UserID] **password** [Authentication Password] [Privacy Password]	G	Create a SNMPv3 user profile.	switch>enable switch#configure switch(config)#snmp v3-user admin password 123 123
no snmp community-strings [Community]	G	Disable SNMP community strings function.	switch>enable switch#configure switch(config)#no snmp community-strings public
no snmp trap server [IP Address]	G	Remove SNMP trap setting.	switch>enable switch#configure switch(config)#no snmp trap server 192.168.1.120
no snmp v3-user [UserID] **password** [Authentication Password] [Privacy Password]	G	Remove SNMPv3 user profile.	switch>enable switch#configure switch(config)#no snmp v3-user admin password 123 123

SNTP Commands

CLI Commands	Level	Description	Example
sntp enable	G	Enable the SNTP function.	switch>enable switch#configure switch(config)#sntp enable
sntp ip [IP]	G	Set the SNTP server IP address. If the SNTP function is inactive, this command cannot be applied.	switch>enable switch#configure switch(config)#sntp ip 192.168.1.1
sntp timezone [Timezone] Format: [1–63]	G	Set timezone index, use “show sntp timzezone” command to get more information about the index number.	switch>enable switch#configure switch(config)#sntp timezone 22
sntp daylight	G	Enable daylight saving time. If the SNTP function is inactive, this command cannot be applied.	switch>enable switch#configure switch(config)#sntp daylight
sntp daylight-period [Start time] [End time] Forrmat: [yyyymmdd-hh:mm]	G	Set period of daylight saving time. If SNTP function is inactive, this command cannot be applied. Parameter format: [yyyymmdd-hh:mm]	switch>enable switch#configure switch(config)#sntp daylight-period 20120808-01:01 20120809-01:01
sntp daylight-offset [Minute]	G	Set offset of daylight saving time. If SNTP function is inactive, this command cannot be applied.	switch>enable switch#configure switch(config)#sntp daylight-offset 60
show sntp	P	Show SNTP information.	switch>enable switch#show sntp
show sntp timezone	P	Show index number of time zone list.	switch>enable switch#show sntp timezone
no sntp	G	Disable SNTP function.	switch>enable switch#configure switch(config)#no sntp
no sntp daylight	G	Disable daylight saving time.	switch>enable switch#configure switch(config)#no sntp daylight

Switch Setting Commands

CLI Commands	Level	Description	Example
show terminal	P	Show console information.	switch>enable switch#show terminal
system name [System Name]	G	Configure system name.	switch>enable switch#configure switch(config)#system name xxx
system location [System Location]	G	Set switch system location string.	switch>enable switch#configure switch(config)#system location xxx

CLI Commands	Level	Description	Example
system description [System Description]	G	Set switch system description string.	switch>enable switch#configure switch(config)#system description xxx
system contact [System Contact]	G	Set switch system contact window string.	switch>enable switch#configure switch(config)#system contact xxx
show system-info	E	Show system information.	switch>show system-info

System Event Log Command

CLI Commands	Level	Description	Example
show syslog	P	Show SYSLOG configuration and log table.	switch>enable switch#show syslog

System Reboot Command

CLI Commands	Level	Description	Example
reload	G	Reboot switch.	switch>enable switch#configure switch(config)#reload

System Warning Commands

CLI Commands	Level	Description	Example
syslog mode [client|server|both]	G	Specified the log mode.	switch>enable switch#configure switch(config)# syslog mode both
syslog ip [IP address]	G	Set system log server IP address.	switch>enable switch#configure switch(config)# syslog ip 192.168.1.100
show syslog	**P**	Show SYSLOG configuration and log table.	**switch>enable switch#configure switch#show syslog**
no syslog	**G**	Disable system log functon.	**switch>enable switch#configure switch(config)#no syslog**
event system-restart syslog	G	Set device restart event type.	switch>enable switch#configure switch(config)#event system-restart syslog
event authentication-failure syslog	G	Set Authentication failure event type.	switch>enable switch#configure switch(config)#event authentication-failure syslog
event syslog [Link-UP|Link-Down|Both]	I	Set port event for SYSLOG.	switch>enable switch#configure switch(config)#interface fastethernet 3 switch(config-if)#event syslog both

CLI Commands	Level	Description	Example
show event	P	Show event selection.	switch>enable switch#show event
no event system-restart syslog	G	Disable device restart event type.	switch>enable switch#configure switch(config)#no event system-restart syslog
no event authentication-failure syslog	G	Disable Authentication failure event type.	switch>enable switch#configure switch(config)#no event authentication-failure syslog
no event syslog	I	Disable port event for system log.	switch>enable switch#configure switch(config)#interface fastethernet 3 switch(config-if)#no event syslog

Traffic Prioritization Commands

CLI Commands	Level	Description	Example
qos prioritytype [port-based|cos-only|tos-only|cos-first|tos-first]	G	Setting of QoS priority type.	switch>enable switch#configure switch(config)#qos prioritytype port-base
qos policy [weighted-fair|strict]	G	Select QoS policy scheduling.	switch>enable switch#configure switch(config)#qos policy weighted-fair
qos priority portbased [Port] [lowest|low|middle|high]	G	Configure port-based priority.	switch>enable switch#configure switch(config)#qos priority portbased 1 low
qos priority cos [Priority] [lowest|low|middle|high]	G	Configure COS Priority.	switch>enable switch#configure switch(config)#qos priority cos 0 middle
qos priority cosportdefault [Port][Priority]	G	Configure COS Port default	switch>enable switch#configure switch(config)#qos priority cosportdefault 1 1
qos priority tos [Priority] [lowest|low|middle|high]	G	Configure TOS Priority	switch>enable switch#configure switch(config)#qos priority tos 3 high
show qos	P	Displays the information of QoS configuration.	switch>enable switch#configure switch#show qos
no qos	G	Disable QoS function.	switch>enable switch#configure switch(config)#no qos

Trunk Commands

CLI Commands	Level	Description	Example
aggregator priority [1–65535]	G	Set port group system priority.	switch>enable switch#configure switch(config)#aggregator priority 22
aggregator group [GroupID] [Port-list] **lacp** **workp** [Workport]	G	Assign a trunk group with LACP active. [GroupID]: 1–3 [Port-list]: Member port list. This parameter can be a port range (for example, 1-4) or a port list separate by a comma (for example, 2, 3, 6). [Workport]: The number of work ports. This value cannot be less than zero or greater than the number of member ports.	switch>enable switch#configure switch(config)#aggregator group 1 1-4 lacp workp 2 or switch(config)#aggregator group 2 1,4,3 lacp workp 3
aggregator activityport [Group ID] [Port Numbers]	G	Set activity port.	switch>enable switch#configure switch(config)#aggregator activityport 1 2
aggregator group [GroupID] [Port-list] **nolacp**	G	Assign a static trunk group. [GroupID]: 1–3 [Port-list]: Member port list. This parameter can be a port range (for example,1-4) or a port list separate by a comma (for example, 2, 3, 6).	switch>enable switch#configure switch(config)#aggregator group 1 2-4 nolacp or switch(config)#aggregator group 1 3,1,2 nolacp
show aggregator	P	Show information for trunk group.	switch>enable switch#show aggregator 1 or switch#show aggregator 2 or switch#show aggregator 3
no aggregator lacp [GroupID]	G	Disable the LACP function of trunk group.	switch>enable switch#configure switch(config)#no aggregator lacp 1
no aggregator group [GroupID]	G	Remove a trunk group.	switch>enable switch#configure switch(config)#no aggregator group 1

Upgrade Firmware Command

CLI Commands	Level	Description	Defaults/Example
tftp [server IP] **upgrade** [file name]	G	Upgrade firmware by TFTP. Need to specify the IP address of the TFTP server and the file name of image.	switch>enable switch#configure switch(config)#tftp 192.168.1.120 upgrade image.bin

VLAN Commands

CLI Commands	Level	Description	Example
vlan database	P	Enter VLAN configure mode.	switch>enable switch#vlan database
vlanmode [portbase| 802.1q | disable| gvrp]	V	Set switch VLAN mode.	switch>enable switch#vlan database switch(vlan)#vlanmode portbase or switch(vlan)#vlanmode 802.1q or switch(vlan)#vlanmode disable or switch(vlan)#vlanmode gvrp
Ported Based VLAN Configuration			
vlan port-based grpname [Group Name] **grpid** [GroupID] **port** [PortNumbers]	V	Add new port based VALN.	switch>enable switch#vlan databaseswitch(vlan)#vlan port-based grpname test grpid 2 port 2-4 or switch(vlan)#vlan port-based grpname test grpid 2 port 2,3,4
show vlan [GroupID] or **show vlan**	V	Show VLAN information.	switch>enable switch#vlan database switch(vlan)#show vlan 2
no vlan [VID]	V	Delete port base group ID.	switch>enable switch#vlan database switch(vlan)#no vlan 2
IEEE 802.1Q VLAN			
vlan 8021q mnt-vid [VID]	V	Configure management VID (0 is disabled).	switch>enable switch#vlan database switch(vlan)#vlan 8021q mnt-vid 22
vlan 8021q name [GroupName] **vid** [VID]	V	Change the name of VLAN group. If the group does not exist, this command cannot be applied.	switch>enable switch#vlan database switch(vlan)#vlan 8021q name test vid 22
vlan 8021q port [PortNumber] **access-link untag** [UntaggedVID]	V	Assign a access link for VLAN by port. If the port belongs to a trunk group, this command cannot be applied.	switch>enable switch#vlan database switch(vlan)#vlan 8021q port 3 access-link untag 22

CLI Commands	Level	Description	Example
vlan 8021q port [PortNumber] **trunk-link tag** [TaggedVID List]	V	Assign a trunk link for VLAN by port. If the port belongs to a trunk group, this command cannot be applied.	switch>enable switch#vlan database switch(vlan)#vlan 8021q port 3 trunk-link tag 2,3,6,99 or switch(vlan)#vlan 8021q port 3 trunk-link tag 3-20
vlan 8021q port [PortNumber] **hybrid-link untag** [UntaggedVID] **tag** [TaggedVID List]	V	Assign a hybrid link for VLAN by port. If the port belongs to a trunk group, this command cannot be applied.	switch>enable switch#vlan database switch(vlan)#vlan 8021q port 3 hybrid-link untag 4 tag 3,6,8 or switch(vlan)#vlan 8021q port 3 hybrid-link untag 5 tag 6-8
vlan 8021q port [PortNumber] **hybrid-link-qinq untag** [UntaggedVID] **tag** [TaggedVID List]	V	Assign a qinq link for VLAN by port. If the port belongs to a trunk group, this command cannot be applied.	switch>enable switch#vlan database switch(vlan)#vlan 8021q port 3 hybrid-link-qinq untag 4 tag 3,6,8 or switch(vlan)#vlan 8021q port 3 hybrid-link-qinq untag 5 tag 6-8
vlan 8021q aggreator [GroupID] **access-link untag** [UntaggedVID]	V	Assign a access link for VLAN by trunk group.	switch>enable switch#vlan database switch(vlan)#vlan 8021q aggreator 3 access-link untag 33
vlan 8021q aggreator [GroupID] **trunk-link tag** [TaggedVID List]	V	Assign a trunk link for VLAN by trunk group.	switch>enable switch#vlan database switch(vlan)#vlan 8021q aggreator 3 trunk-link tag 2,3,6,99 or switch(vlan)#vlan 8021q aggreator 3 trunk-link tag 3-20
vlan 8021q aggreator [GroupID] **hybrid-link untag** [UntaggedVID] **tag** [TaggedVID List]	V	Assign a hybrid link for VLAN by trunk group.	switch>enable switch#vlan database switch(vlan)#vlan 8021q aggreator 3 hybrid-link untag 4 tag 3,6,8 or switch(vlan)#vlan 8021q aggreator 3 hybrid-link untag 5 tag 6-8
vlan 8021q aggreator [GroupID] **hybrid-link-qinq untag** [UntaggedVID] **tag** [TaggedVID List]	V	Assign a qinq link for VLAN by trunk group.	switch>enable switch#vlan database switch(vlan)#vlan 8021q aggreator 3 hybrid-link-qinq untag 4 tag 3,6,8 or switch(vlan)#vlan 8021q aggreator 3 hybrid-link-qinq untag 5 tag 6-8

CLI Commands	Level	Description	Example
show vlan [GroupID] or **show vlan**	V	Show VLAN information.	switch>enable switch#vlan database switch(vlan)#show vlan 2
no vlan [GroupID]	V	Delete port base group ID.	switch>enable switch#vlan database switch(vlan)#no vlan 2

APPENDIX C - GLOSSARY

Term	Definition
AWG	American wire gauge (AWG), also known as the Brown & Sharpe wire gauge, is a standardized wire gauge system used predominantly in the United States and Canada for the diameters of round, solid, nonferrous, electrically conducting wire.
Bandwidth	The maximum data transfer speed available to a user through a network.
CLI	A command-line interface (CLI), is a means of interacting with a computer program where the user (or client) issues commands to the program in the form of successive lines of text (command lines).
COS	Class of service (COS) is a parameter used in data and voice protocols to differentiate the types of payloads contained in the packet being transmitted. The objective of such differentiation is generally associated with assigning priorities to the data payload.
CSMA/CD	Carrier Sense Multiple Access/Collision Detection is the access method used on an Ethernet network. A network device transmits data after detecting that a channel is available. However, if two devices transmit data simultaneously, the sending devices detect a collision and retransmit after a random time delay.
DDM	Digital Diagnostics monitoring (DDM) enables you to monitor real-time parameters of the SFP ports and set whether the port logs alarm events to the Syslog on the switch.
DHCP	Dynamic Host Configuration Protocol is a utility that enables a server to dynamically assign IP addresses from a predefined list and limit their time of use so that they can be reassigned. Without DHCP, an IT manager would need to manually enter in all the IP addresses of all the computers on the network. If DHCP is used, whenever a computer logs onto the network, it automatically gets an IP address assigned to it.
DIN Rail	A DIN rail is a metal rail of a standard type widely used for mounting circuit breakers and industrial control equipment inside equipment racks.
DNS	Domain Name Service is a program that translates URLs to IP addresses by accessing a database maintained on a collection of Internet servers. The program works behind the scenes to facilitate surfing the Web with alpha versus numeric addresses. A DNS server converts a name like mywebsite.com to a series of numbers like 107.22.55.26. Every website has its own specific IP address on the Internet.
DSCP	Differentiated Services Code Point (DSCP) is a field in an IP packet that enables different levels of service to be assigned to network traffic. This is achieved by marking each packet on the network with a DSCP code and appropriating to it the corresponding level of service.
GVRP	GARP VLAN Registration Protocol or Generic VLAN Registration Protocol (GVRP) is a protocol that facilitates control of virtual local area networks (VLANs) within a larger network. GVRP conforms to the IEEE 802.1Q specification, which defines a method of tagging frames with VLAN configuration data. This allows network devices to dynamically exchange VLAN configuration information with other devices.
HTTP	The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypermedia information systems, and is the foundation of data communication for the World Wide Web. Hypertext is a multi-linear set of objects, building a network by using logical links (the so-called hyperlinks) between the nodes (text or words). HTTP is the protocol to exchange or transfer hypertext.
IEEE	Institute of Electrical and Electronics Engineers, New York, www.ieee.org. A membership organization that includes engineers, scientists and students in electronics and allied fields. It has more than 300,000 members and is involved with setting standards for computers and communications.
IGMP Snooping	IGMP snooping is the process of listening to Internet Group Management Protocol (IGMP) network traffic. The feature allows a network switch to listen in on the IGMP conversation between hosts and routers. By listening to these conversations the switch maintains a map of which links need which IP multicast streams. Multicasts may be filtered from the links that do not need them, and this controls which ports receive specific multicast traffic.
I/O	Input / Output. The term used to describe any operation, program or device that transfers data to or from a computer.

Term	Definition
IP	Internet protocol. A set of rules used to send and receive messages across local networks and the Internet.
IP Address	A 32-bit number that identifies each sender or receiver of information that is sent across the Internet. An IP address has two parts: an identifier of a particular network on the Internet and an identifier of the particular device (which can be a server or a workstation) within that network.
IPv4	Internet Protocol version 4 (IPv4) is the fourth version in the development of the Internet Protocol (IP) and the first version of the protocol to be widely deployed. It is one of the core protocols of standards-based internet working methods of the Internet, and routes most traffic in the Internet.
LACP	Within the IEEE specification, the Link Aggregation Control Protocol (LACP) provides a method to control the bundling of several physical ports together to form a single logical channel. LACP allows a network device to negotiate an automatic bundling of links by sending LACP packets to the peer (directly connected device that also implements LACP).
LAN	Local Area Network. A system of connecting PCs and other devices within the same physical proximity for sharing resources such as an Internet connections, printers, files and drives.
LED	A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices.
LLDP	The Link Layer Discovery Protocol (LLDP) is a vendor-neutral link layer protocol in the Internet Protocol Suite used by network devices for advertising their identity, capabilities, and neighbors on an IEEE 802 local area network, principally wired Ethernet.
MAC Address	Media Access Control address. A unique code assigned to most forms of networking hardware. The address is permanently assigned to the hardware. Limiting a wireless network's access to hardware, such as wireless cards, is a security feature employed by closed wireless networks. However, an experienced hacker armed with the proper tools can still figure out an authorized MAC address, masquerade as a legitimate address, and access a closed network. Every wireless 802.11 device has its own specific MAC address hard-coded into it. This unique identifier can be used to provide security for wireless networks. When a network uses a MAC table, only 802.11 radios that have had their MAC addresses added to that network's MAC table will be able to get onto the network.
MDI/MDIX	A Medium Dependent Interface (MDI) describes the interface (both physical and electrical) in a computer network from a physical layer implementation to the physical medium used to carry the transmission. Ethernet over twisted pair also defines a medium dependent interface crossover (MDIX) interface. Auto-MDIX ports on newer network interfaces detect if the connection would require a crossover, and automatically chooses the MDI or MDIX configuration to properly match the other end of the link.
PPP Point-to-Point	The Point-to-Point Protocol (PPP) is a data link protocol commonly used in establishing a direct connection between two networking nodes. It can provide connection authentication, transmission encryption (using ECP, RFC 1968), and compression.
RJ-45	Standard connectors used in Ethernet networks. RJ-45 connectors are similar to standard RJ-11 telephone connectors, except that RJ-45 connectors can have up to eight wires, whereas telephone connectors have four wires.
Router	A device that forwards data from one WLAN or wired local area network to another.
RSTP/STP	In 2001, the IEEE introduced Rapid Spanning Tree Protocol (RSTP) as 802.1w. RSTP provides significantly faster spanning tree convergence after a topology change, introducing new convergence behaviors and bridge port roles to do this. RSTP was designed to be backwards-compatible with standard STP.
RX	Receive.
Server	A computer that provides its resources to other computers and devices on a network. These include print servers, Internet servers and data servers. A server can also be combined with a hub or router.

Term	Definition
SNMP	Simple Network Management Protocol (SNMP) is an Internet-standard protocol for managing devices on IP networks. Devices that typically support SNMP include routers, switches, servers, workstations, printers, modem racks and so on. It is used mostly in network management systems to monitor network-attached devices for conditions that warrant administrative attention.
SNMP Trap	SNMP traps are notifications or messages sent by a networked device to a management system. The messages are sent over the UDP protocol. The SNMP trap includes the IP address of the sender, the generic ID, specific ID, OID and corresponding value.
SNTP	Simple Network Time Protocol (SNTP) is a less complex implementation of NTP, using the same protocol, but without requiring the storage of state over extended periods of time. It is used in some embedded devices and in applications where high accuracy timing is not required. Network Time Protocol (NTP) is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks.
STP	The Spanning Tree Protocol (STP) is a network protocol that ensures a loop-free topology for any bridged Ethernet local area network. The basic function of STP is to prevent bridge loops and the broadcast radiation that results from them. Spanning tree also allows a network design to include spare (redundant) links to provide automatic backup paths if an active link fails, without the danger of bridge loops, or the need for manual enabling/disabling of these backup links.
Sub Network or Subnet	Found in larger networks, these smaller networks are used to simplify addressing between numerous computers. Subnets connect together through a router.
Switch	A type of hub that efficiently controls the way multiple devices use the same network so that each can operate at optimal performance. A switch acts as a networks traffic cop. Rather than transmitting all the packets it receives to all ports as a hub does, a switch transmits packets to only the receiving port.
Telnet	Telnet is a network protocol used on the Internet or local area networks to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection.
TFTP	Trivial File Transfer Protocol (TFTP) is a file transfer protocol notable for its simplicity. It is generally used for automated transfer of configuration or boot files between machines in a local environment.
Transmit Power	The power (usually expressed in mW or dBm) at which the wireless device transmits.
UDP	The User Datagram Protocol (UDP) is one of the core members of the Internet protocol suite, the set of network protocols used for the Internet. With UDP, computer applications can send messages, in this case referred to as datagrams, to other hosts on an Internet Protocol (IP) network without prior communications to set up special transmission channels or data paths.
UL	Underwriter Laboratories (UL) is one of several companies approved to perform safety testing by the US federal agency Occupational Safety and Health Administration (OSHA).
UTC	Coordinated Universal Time (UTC) is the primary time standard by which the world regulates clocks and time. It is one of several closely related successors to Greenwich Mean Time (GMT). For most purposes, UTC is synonymous with GMT.
VLAN	Virtual LAN (VLAN) is a logical network grouping that limits the broadcast domain and allows you to isolate network traffic so that members of the same VLAN only receive traffic from each other. Creating a VLAN on a switch is the logical equivalent of reconnecting a group of network devices to another Layer 2 switch. However, all the network devices are still physically plugged into the same switch.
VPN	Virtual Private Network (VPN) is a type of technology designed to increase the security of information transferred over the Internet. VPN can work with either wired or wireless networks, as well as with dial-up connections over POTS. VPN creates a private encrypted tunnel from the end user's computer, through the local wireless network, through the Internet, all the way to the corporate servers and database.
WAN	Wide Area Network. A communication system of connecting PCs and other computing devices across a large local, regional, national or international geographic area. Also used to distinguish between phone-based data networks and Wi-Fi. Phone networks are considered WANs and Wi-Fi networks are considered Wireless Local Area Networks (WLANs).

Term	Definition
Wi-Fi	Wireless Fidelity. An interoperability certification for wireless local area network (LAN) products based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standard.

Notes

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